Business Planning for Town Water Services

Guidance Manual

Step 1
Assess current performance - service levels and operations
Assess demand and establish consumer preferences

Step 2
Prepare a management and operations plan
Sketch out technical designs and establish costs
Cross-check to willingness and ability to pay

Prepare Financial projection
Agree financing plan with financiers
Agree performance indicators for Monitoring and Evaluation

Step 3

Bank Netherlands Water Partnership
Project #043
Town Water Supply and Sanitation Initiative
The World Bank Group
Washington, DC
The World Bank Group

Water Supply & Sanitation
Sector Board

Bank Netherlands Water Partnership

Preparation Team

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Foreword

This Guidance Manual and the accompanying Modules and Financial Models are an output of Phase Two of the Town Water Supply and Sanitation Initiative (TWSSI). Together they comprise Volume II of the TWSSI. The Guidance Manual provides advice about how to implement a business planning approach for town water services. It is based on principles established during Phase One of the TWSSI, as set out in the Volume I reports, Principles of Town Water Supply and Sanitation and the Guide to Strategic Planning for Improved Sanitation in Small Towns.

The Guidance Manual and Modules have been refined on the basis of lessons learned through pilot studies in selected towns and working with local advisors in Tanzania and the State of Maharashtra (India). It is hoped that the business planning approach can be used in other countries and states to support programmes of work-based learning that help to build local capacity in the town WSS sub-sector.

All Volumes are available on the cdrom.

Acknowledgements

The Town Water Supply and Sanitation Initiative (TWSSI) was funded by the Bank Netherlands Water Partnership. Phase Two of the project was task managed by Robert Roche and Mukami Kariuki. Nicholas Pilgrim acted as project manager. The project team for preparation of these guidelines included: Kevin Tayler (water and sanitation engineer and town planner), Sophie Tremolet (institutional and regulatory advisor), Ross Tyler (small and medium enterprise development advisor), and Tim Yates (financial advisor). Nick Pilgrim prepared the contract and M&E framework, Cledan Mandri-Perrot prepared the legal provisions of operator contracts, and Thelma Triche reviewed materials relating to contracts and market entry of local private operators.

The Guidance Manual and Modules were field tested in India and Tanzania, in the context of ongoing Town water supply reforms being undertaken by National and Local Governments. In India this effort was coordinated with the Water Supply and Sanitation Department of the Government of Maharashtra. This was carried out in the context of ongoing reforms in the state, and with support of World Bank and WSP staff, N.V.V. Raghava, Ajit Kumar and Nandita Nagpal Vohra. In Tanzania, this effort was coordinated with the Ministry of Water and Livestock Development, supervised by Gabriel Lwakabare, the Project Manager for the Rural Water and Sanitation Project with support from Ato Brown of the World Bank. In both countries local consultants reviewed the implementation materials/methodology. Price WaterhouseCoopers, Mumbai, is testing the approach in two towns in Maharashtra (Pen and Narkhed). Don Consult, Hydroworks, and Cowi Tanzania reviewed the materials as a potential input to towns under the World Bank assisted Rural Water and Sanitation Project in Tanzania.
This manual sets out an approach to planning town water supply as a business. The “business planning” approach is both strategic, in that business plans can be used to rationalize investment in the sector, and operational, in that it encourages towns to evaluate their existing water services in a comprehensive manner and prioritize actions they can take to improve areas they have identified as critical.

This Main Manual gives an overview of the business planning approach and process – additional guidance and tools to implement the approach are provided in accompanying modules.

Context

The objective of the Town Water Supply and Sanitation Initiative (TWSSI) (Bank-Netherlands Water Partnership project #043) is to find solutions for improved, sustainable water supply and sanitation service provision in towns within the population range of 2,000 to 200,000 people. This Guidance Manual on business planning for town water services has been developed as part of Phase II of the project and reflects learning accumulated from the TWSSI Phase I report and background reports prepared under the TWSSI (see the Bibliography in Annex F) as well as previous experience. It has been refined on the basis of lessons learned through pilot studies in selected towns and working with local consultants in Tanzania and the State of Maharashtra (India).

Why focus on towns?

Within the next year or so, the world will cross a threshold where more than half of the population lives in urban centers¹. Rapid urbanisation is often associated with large cities and as a result, many governments focus their attention and resources on meeting infrastructure and service gaps in large cities. However “Towns” account for a large and growing proportion of this growth— about one third of the population in Africa and Asia currently live in towns and this number will double in the next 15 years at a rate five times faster than the urban populations of industrialized countries.

As a result, over the next few decades, towns will become an important priority for infrastructure and service delivery. Small towns will pose a particular challenge as they often outnumber medium and large towns— for every town with over 100,000 people, there are typically ten or more smaller towns— but suffer from inadequate, human, economic and financial resources. Furthermore because they fall in the grey area between rural village and urban center, neither the urban utility model, nor the community management approach is appropriate.

The big challenge for managers of small towns, particularly those with populations between 2,000 and 50,000, is therefore, how to expand services at a pace that allows the town to keep up with population growth, and maintain financial stability. This manual outlines a business planning approach that aims to strike an appropriate balance between over-designed systems— that quickly fall into disrepair for lack of adequate resources, and those that are under-designed— and only meet the needs of a fraction of households.

The traditional approach to planning town water supply?

Traditional approaches to planning town water supply and sanitation often design for the long term—a planning horizon of 20 years based on estimates of future population and per capita water consumption. In many cases, a significant “one time” capital investment is made in the system with the intention that no further investment will be required in the short term. However as a sizeable number of households may have access to an alternative water supply; towns may have limited management and operational capacity; and the prospects of economic growth may be uncertain, this approach runs the risk of creating “white elephants”. In many small towns this approach has led to wastage, system shut downs, financial insolvency and an overall downward spiral in the quality of services.

The “business planning” approach to sustainable town WSS?

This manual advocates a “business planning” approach to town water supply and sanitation that aims to break this cycle of wastage and decline. By planning WSS services as a business, the traditional approach to long term planning is replaced by an approach that balances long term planning with short term capacity. Investments are phased and implemented in stages to ensure financial viability of systems in the short to medium term. Through a bottom up process that involves stakeholders in the identification of preferences; analyses existing service provider performance; and matches designs to (human, financial and economic) resource constraints, the “business planning” approach aims to increase the efficiency of resource allocation and ensure sustainability of services. Figure 1 presents a simplified outline of the key elements of a business planning approach.

Key elements of the Business Planning Approach at Town Level

- Step 1: Assess current performance - service levels and operations
- Assess demand and establish consumer preferences
- Step 2: Prepare a management and operations plan
- Sketch out technical designs and establish costs
- Cross-check to willingness and ability to pay
- Prepare Financial projection
- Agree financing plan with financiers
- Agree performance indicators for Monitoring and Evaluation
- Step 3:
This *Guidance Manual* and the accompanying *Modules* provide practical advice about how to implement a “business planning” approach. The three step approach to business planning presented in these documents is summarized in Figure 1. It comprises:

- **Step 1. Identifying critical issues and prioritising interventions:** includes collecting baseline information and preparing an *Initial Assessment Report* to better understand the situation the utility is currently in and the key challenges moving forward. The objective is to define concrete, time-bound objectives for improvements along institutional, financial or technical lines. Emphasis is placed on identifying improvements that can be implemented “in time” and lead to a positive impact on performance, as well as other longer-term improvements. The importance of gathering and evaluating information is emphasised throughout the business planning process.

- **Step 2. Preparing the business plan:** involves preparing a five year “business plan” that sets out measures the town’s utility will take to meet demand and improve services over time; testing and cross checking various options to ensure their viability; and including performance standards in technical and financial plans that allow results to be measured over time. It also involves identifying gaps in capacity and arranging to fill these through “professional support” options such as a “routine operator”, “specialist service provider” of “full-service operator”; and requires towns to assess whether to join forces with neighbouring towns to yield scale economies (a process referred to as “aggregation”). The outputs of this process comprise the key building blocks of the business plan—a living document to be adjusted over time as conditions and capacities change.

- **Step 3. Formalising relationships and implementation arrangements:** consists of formalising institutional arrangements through agreements and contracts that outline roles and responsibilities and allow monitoring of progress. Several types of agreements may be required: including a contract with a “specialist service provider” or “full-service operator”. Institutional arrangements governing the water utility may also need to be revised or strengthened and a monitoring and evaluation framework set out. Such a framework could be used, for example, by the providers of finance or the local stakeholders to ensure that the objectives set out in the business plan are effectively fulfilled.

Before carrying out these steps it is assumed that governments will have established a sound basis for reforming town water supply by putting in place a policy framework that creates incentives for towns to undertake reform actions; and appropriate institutional arrangements that ensure transparency, accountability and representation. The actions that build this foundation are Step O in the modules. The three step process outlined below will enable towns to:

- **Identify immediate needs for improvement** — support “quick-wins” to bring about continuous improvements that are affordable in the short term.
- **Plan ahead but phase in investments as resources allow** — delineate the town utility’s long term program in a systematic manner that allows for investments to be phased over time.
- **Determining whether to join forces with other towns or go it alone** — this decision may be dictated by source constraints
- **Select the best option for managing the town utility** — contracting professional support if needed to provide short or long term inputs.
- **Build the capacity of all involved at town level** — involve stakeholders in design and keep them up to date on activities and progress.
**Figure 1 - Steps of the Business Planning Process**

<table>
<thead>
<tr>
<th>SIGN MOU TOWN / MINISTRY</th>
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</thead>
<tbody>
<tr>
<td><strong>1 – IDENTIFY CRITICAL ISSUES AND PRIORITIZE INTERVENTIONS</strong></td>
</tr>
<tr>
<td>1.1 Consult Local Stakeholders</td>
</tr>
<tr>
<td>1.2 Assess Institutional Arrangements</td>
</tr>
<tr>
<td>1.5 Understand the Market</td>
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<td></td>
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<tr>
<td><strong>1.6 Identify Critical Issues and Prioritize Interventions</strong></td>
</tr>
<tr>
<td><strong>OUTPUT - Initial Assessment Report &amp; Step 2 Action Plan</strong></td>
</tr>
</tbody>
</table>

**2 – PREPARE THE BUSINESS PLAN**

<table>
<thead>
<tr>
<th>2.1a Select an Appropriate Institutional Arrangement</th>
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<tbody>
<tr>
<td>Independent</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>2.1b Select Professional Support Options</strong></td>
</tr>
<tr>
<td>Routine operator + specialist services</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>2.2 Draw up Investment, Operation and Financing Plans</strong></td>
</tr>
<tr>
<td><strong>OUTPUT - Business Plan</strong></td>
</tr>
</tbody>
</table>

**3 – FORMALIZE RELATIONSHIPS AND IMPLEMENT ARRANGEMENTS**

| 3.1 Prepare Contractual Arrangements |
| 3.2 Revise Institutional Arrangements |
| 3.3 Establish Monitoring and Evaluation Framework |
| **OUTPUTS - Contracts, Institutional Arrangements and Monitoring Tools** |
Who should be in charge of business planning at town level?

The underlying assumption of the business planning approach is that the “town utility” (the term utility is taken as synonymous with a dedicated group of people and functions concerned with corporate oversight and operations, e.g. a town water board and operator) prepares the business plan, with appropriate support from internal or external advisors (typically a team of consultants)—

The team responsible for overseeing the development of the business plan and managing the responsible advisors is likely to include:

- The town operations manager, who would have the technical knowledge about operations (and sometimes investments) and would interact daily with the advisors;
- Representatives of the corporate oversight body, responsible for overseeing the town operations manager and guiding the business planning process;
- Representatives of the municipality, who would need to approve business plans, and is responsible for setting local development objectives and regulating the town utility based on objectives set out in business plans.

As local, regional and national entities are likely to be involved in various aspects of the business planning process, a key role for this team is to organise consultations with local and national stakeholders (if applicable, as providers of finance) to ensure that choices made during the business planning process reflect stakeholders’ concerns and priorities.

What role for central governments in business planning at town level?

Given the large number of towns in any given country, and the fact that many towns (particularly small towns) are likely to require some financial support, central governments are likely to play a key role in creating the conditions for fostering reforms (see Module O.)

Such support may be made conditional on a town utility's performance—agreement to undertake reform actions; or monitoring of indicators in the business plan. Ideally, towns should obtain financing on an ongoing basis (as requirements change and they demonstrate improved performance), rather than relying on a “one-time” grant.

Agreements regarding institutional and financial reforms should ideally be captured in a memorandum of understanding (MoU) signed between the town and the central government. Such an MoU, would commit the town to adopting a business planning approach against which technical assistance from advisors and financing for identified improvements would be provided. The business plan would form the basis for monitoring town performance (indicators) and securing additional financing through grants or even loans (once the utility becomes creditworthy).

Who is this Guidance Manual for and how should it be used?

The primary audience for this manual is town officials and their “advisor(s)”—staff or consultants engaged to assist towns in preparing their business plans. A secondary audience is central governments who may use the manual to build town capacity for planning and managing their services; or as background material for establishing an effective policy and legal framework.
While the manual and modules assumes that a town water operator with an independent corporate oversight body has been or will be established (see Step 0), if this is not already the case, Governments could apply this approach on a pilot basis to test the ability of towns to plan and operate their water services effectively.

**What does this Guidance Manual consist of?**

This Guidance Manual provides the context for the Six Modules that outline the Business Planning approach. In Section A (this section), the Manual sets out the main components of business planning for town water services. In section B it provides a walk through of the business planning process and an outline of the main outputs that the town will need to prepare. It also contains annexes with a glossary of key terms used in this manual and modules, and a list of references.

**The Foundation Modules (Step 0):**

The foundation modules set the stage for implementing the Business Plan. Each of the five sections outlined in Step 0 lay out the actions governments, towns and advisors should take in order to enable successful implementation of the business planning process.

**Table 1 – Foundation Modules: Step 0.**

<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Title</th>
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<tbody>
<tr>
<td>Section 0.1</td>
<td>Principles for overcoming the town water challenge</td>
</tr>
<tr>
<td>Section 0.2</td>
<td>Principles for analysing town-level water functions</td>
</tr>
<tr>
<td>Section 0.3</td>
<td>Principles for cost-effective design and operations</td>
</tr>
<tr>
<td>Section 0.4</td>
<td>Analyzing national policies on town water supply and gathering data</td>
</tr>
<tr>
<td>Section 0.5</td>
<td>Preparing a Memorandum of Understanding Town/ Ministry</td>
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</table>

**Section 0.1** provides a rapid overview of the town water supply challenge and outlines principles for a successful water supply strategy. It argues that adopting a structured approach through business planning can lead to successful implementation.

**Section 0.2** sets out the operational functions that are most important for small towns. It provides a basis for performance evaluation at town level (Module 1.2), select professional support options (Module 2.1), and contract operators (Module 3.1).

**Section 0.3** provides an introduction to cost effective design and operational efficiency and identifies the challenges faced in trying to achieve this in Towns. It provides the basis for understanding the technical considerations (Module 1.3) to take into account.

**Sections 0.4 and 0.5** provide guidance on preparing the ground for the business planning process at town level: understanding the national policy and legislative framework and agreeing a reform agenda between the government and town (MoU).
The Business Planning Modules

Business Planning Modules consist of a set of “how to” notes about carrying out each of the steps laid out in the business planning process. Each module covers a specific topic and can therefore be read alone. For example, Module 1.3 covers technical issues and may therefore be of most use to technical specialists on the team whereas Module 1.4 provides a tool for financial modelling that is aimed at financial specialists.

Table 2 – Business Planning Modules

<table>
<thead>
<tr>
<th>Step Number</th>
<th>Module Number</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td>Identify critical issues and prioritize interventions</td>
</tr>
<tr>
<td>Step 1.1</td>
<td>1.1</td>
<td>Consult local stakeholders</td>
</tr>
<tr>
<td>Step 1.2</td>
<td>1.2</td>
<td>Assess Institutional Arrangements</td>
</tr>
<tr>
<td>Step 1.3</td>
<td>1.3</td>
<td>Understand the Utility – Technical Aspects</td>
</tr>
<tr>
<td>Step 1.4</td>
<td>1.4</td>
<td>Understand the Utility – Financial Aspects</td>
</tr>
<tr>
<td>Step 1.5</td>
<td>1.5</td>
<td>Understand the Market</td>
</tr>
<tr>
<td>Step 1.6</td>
<td>1.6</td>
<td>Identify critical issues and define strategic objectives</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td>Prepare the Business Plan</td>
</tr>
<tr>
<td>Step 2.1</td>
<td>2.1</td>
<td>Select institutional arrangements and formulate choices on sources of professional support</td>
</tr>
<tr>
<td>Step 2.2</td>
<td>2.2</td>
<td>Draw up Investment, Management and Operations, and Financing Plans, and prepare the Business Plan**</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td>Formalize relationships and implement the arrangements</td>
</tr>
<tr>
<td>Step 3.1</td>
<td>3.1</td>
<td>Prepare Operator Contracts</td>
</tr>
<tr>
<td>Step 3.2</td>
<td>3.2</td>
<td>The Contract (Key Provisions)</td>
</tr>
<tr>
<td>Step 3.3</td>
<td>3.3</td>
<td>Prepare Monitoring and Evaluation Framework</td>
</tr>
</tbody>
</table>

*Step 1.6 leads to preparation of the Initial Assessment Report and Step 2 Action Plan, but is also technically the first stage in preparing the business plan.

** The investment, management and operations, and financing plans are interlinked and together make up key components of the business plan.

Two Excel-based financial models accompany Modules 1.4, 1.6 and 2.2:

- The **town water financial model (TWFM)** is a conventional financial model, which generates pro forma financial statements and financial indicators for an autonomous water supply business for a forecast period of up to 20 years. It was developed by WRc during Phase 1 of the TWSSI work and amended for incorporation to this Manual;

- The **cash flow model (CFM)** is intended to compare operational or cash management interventions (rather than larger scale investments) for the purpose of prioritizing interventions. It can use time steps down to a month and takes a detailed view of working capital movements. It is limited to 20 time steps and does not produce financial statements.
B. THE BUSINESS PLANNING PROCESS

This section contains a step-by-step walk through the business planning process set out in Figure 1 above, and a description of the outputs that the town (and its advisors) will need to prepare. These outlines should not be treated as a formal requirement but as a guide to the type of analysis that needs to be conducted.

INITIAL STEP – ADVISORS PREPARATION

The advisors in charge of assisting a town prepare its business plan should start by reviewing existing legislation and national policies in order to understand and explain what reform options are available at the local level and what national policies mandate in terms of reform. At this stage, they should also familiarize themselves with the overall approach presented in this Guidance Manual.

<table>
<thead>
<tr>
<th>ACTIONS TO BE UNDERTAKEN BY CONSULTANTS/ADVISORS</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Review policies and laws to identify models for town water services recommended by central/regional government</td>
<td>Presentation to town with</td>
</tr>
<tr>
<td>• Evaluate which professional support options are possible</td>
<td>• Overall reform context</td>
</tr>
<tr>
<td>o What contracting options are allowed?</td>
<td>• Main reform options available at town level</td>
</tr>
<tr>
<td>o Is aggregation of small towns allowed and recommended?</td>
<td>• Funding sources, availability and conditions</td>
</tr>
<tr>
<td>o Is the legal framework sufficiently clear on those options?</td>
<td></td>
</tr>
<tr>
<td>• Evaluate future funding sources and flows to towns and conditions related to such funding</td>
<td>This presentation should be written in layman’s terms, for the first meeting with stakeholders at town level in Step 1.</td>
</tr>
<tr>
<td>o Is central funding available for water services in towns?</td>
<td></td>
</tr>
<tr>
<td>o Is funding conditional on reform at town level?</td>
<td></td>
</tr>
<tr>
<td>o Are towns required to enter into a specific agreement (e.g., MOU) with central Government to obtain such funding?</td>
<td></td>
</tr>
</tbody>
</table>

See Module 0.1 for an overall introduction to the approach and guiding principles.

See Module 0.4 for guidance on how to analyze national-level policies and reform implications at town level. Module 2.1. setting out professional support options is also useful.

TAKE NOTE!
The Towns advisors may already be very familiar with national policies, having worked in other towns before. In that case, only limited preparation may be required. However, the guidance provided in Module 0.4 will help the advisors to evaluate such policies in a more systematic manner and examine whether new institutional options may be legally possible. Preparing a summary note would also be useful to brief town representatives about policies they may not be familiar with.
Before starting the business planning process at town level, it may be advisable for the town to sign an MoU with the entity providing finance for the exercise and any resulting investments that might follow.

The MoU should set out the broad service improvement objectives; institutional arrangements at town level to oversee reforms; funding commitments from the higher level of government; and criteria for releasing funds. This release of funding to the town would be linked to achievement of agreed milestones, and based on a periodic assessment of the town’s compliance with the MoU (and subsequently the business plan).

**TAKE NOTE!**

Preferably, the MoU would also involve the corporate oversight entity of the town water utility, for example, in Tanzania and Ethiopia this would be the town Water Board. Indeed, the water utility is most likely to be the key party that will adopt and implement the business planning approach, with the help of a local consultant/advisor or contracted private operator, even if the funds are likely to transit via the local government.

### ACTIONS BY CONSULTANT-ADVISOR / TOWN / MINISTRY

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>OUTPUTS</th>
</tr>
</thead>
</table>
| • Initiate contact with government institution prepared to provide funding based on reform at town level  
• Develop the MoU central/regional government - town:  
  o Town’s agreement to broad reform plan  
  o Conditions for funding initial improvements (including for developing business plan and any “quick fixes”)  
  o Conditions for funding the Business Planning process and advisors for providing assistance  
  o Identification of specific milestones for releasing funds to towns | A Memorandum of Understanding between central/regional government and town  
This document may be revised as information becomes available |

☎ See Module 0.5. for guidance on how such an MoU can be structured and monitored.  
☎ See Module 3.3 for guidance on performance monitoring including pass/fail type milestones

**TAKE NOTE!**

Institutional arrangements (such as the formation of a Corporate Oversight Board) may need to be in place before planning begins. If such entity is not in place, the MoU could specify the creation of a “reform oversight” board or entity, which could either evolve at later stages to oversee the entity or be dissolved.
STEP 1 – IDENTIFY CRITICAL ISSUES AND PRIORITIZE INTERVENTIONS

Based on the initial review of the national policies and legal framework, the towns advisors will support the key players at town level to:

- Consult local stakeholders to identify critical issues for the town’s water services;
- Review whether existing institutional arrangements are adequate or should be reformed;
- Carry out a technical and financial assessment of town water services;
- Identify the strengths and weaknesses of the current service and the needs for improvement in order to meet future demand and allow service expansion;
- Identify what immediate improvements can be carried out.

**TAKE NOTE!**
This Step focuses on information gathering and analysis: the advisors will need to assess what information is absolutely necessary and what would be useful but too time consuming to gather— if it does not already exist. The town should also learn from this exercise to keep better information records and set up a system for doing so.

Step 1 consists of six sub-Steps. The main outputs are the Initial Assessment Report prepared in Step 1 and the Step 2 Action Plan.

**STEP 1.1 – CONSULT LOCAL STAKEHOLDERS**

The advisors will start by meeting local stakeholders in order to present the overall approach to reform, ensure adequate understanding of the policy framework, and present the proposed business planning approach.

<table>
<thead>
<tr>
<th>ACTIONS TO BE UNDERTAKEN BY THE CONSULTANT/ADVISOR</th>
<th>OUTPUTS</th>
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<tbody>
<tr>
<td>- Identify relevant stakeholders at town level</td>
<td>A workshop at town level to introduce the approach and identify critical issues.</td>
</tr>
<tr>
<td>- Identify reform-minded leaders at town level: form a small team to lead the business planning process and define consultation mechanisms</td>
<td><strong>Summary memo</strong> setting out</td>
</tr>
<tr>
<td>- Organise consultation to establish the goals of the exercise:</td>
<td>- Critical issues identified by stakeholders</td>
</tr>
<tr>
<td>o What are the most pressing issues in the town at present?</td>
<td>- Information gaps and ways to develop such information</td>
</tr>
<tr>
<td>o What solutions have been identified at this stage?</td>
<td>- Consultation needs outside town (e.g. in neighbouring towns)</td>
</tr>
<tr>
<td>o What professional support options are they likely to explore?</td>
<td></td>
</tr>
<tr>
<td>- Explore available information about the town, water supply system and utility in order to identify available information and potential gaps.</td>
<td></td>
</tr>
<tr>
<td>- If it is clear that town level improvements require drawing on external actors (other towns, contractors) then there is a need to initiate discussions</td>
<td></td>
</tr>
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</table>

[See Module 1.1. on guidance for consulting local stakeholders, Module 0.1 for guidance on how to present the Town Water Challenge at town level as well as Modules 2.1 on professional support options.]

[See Modules 1.2 to 1.5 for guidance on market, institutional, technical and financial information required.]
**STEP 1.2 - ASSESS INSTITUTIONAL ARRANGEMENTS**

The advisors should review the existing institutional arrangements, including the manner in which the overall water sector functions under existing policy, and how policies are put into practice.

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<thead>
<tr>
<th>ACTIONS UNDERTAKEN BY THE CONSULTANT/ADVISOR</th>
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<tbody>
<tr>
<td>• Review the overall institutional framework in which the town water utility is operating</td>
<td>Input into Initial Assessment Report Section on “Assess Institutional Arrangements”</td>
</tr>
<tr>
<td>• Assess how water service functions (service provision, corporate oversight, regulation, asset ownership and local-level policy setting) are currently performed and how they could be improved</td>
<td></td>
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<tr>
<td>• Identify the need for professional support and potential options</td>
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Module 0.2 presents a framework for analysing water sector functions at town level and Module 1.2 provides a framework to assess institutional arrangements.

**STEPS 1.3 AND 1.4 - UNDERSTAND THE UTILITY - TECHNICAL AND FINANCIAL ASPECTS**

The advisors should also evaluate the town utility’s current technical and financial position and identify areas which could be improved.

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<tr>
<th>ACTIONS UNDERTAKEN BY THE CONSULTANT/ADVISOR</th>
<th>OUTPUTS</th>
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</thead>
<tbody>
<tr>
<td>• Carry out an audit of the utility’s operational performance</td>
<td>Input into Initial Assessment Report Section on “Understand the Utility”. These inputs will later feed into a main section of the Business Plan.</td>
</tr>
<tr>
<td>• Carry out a financial audit of the utility to assess current financial performance and self-financing capacity</td>
<td></td>
</tr>
<tr>
<td>• Identify immediate improvements and “quick-wins”</td>
<td></td>
</tr>
<tr>
<td>• Identify longer-term improvement options for operational efficiency and investments</td>
<td></td>
</tr>
<tr>
<td>• Collect baseline information</td>
<td></td>
</tr>
</tbody>
</table>

Modules 1.3 and 1.4 give you step-by-step guidance to carry out this analysis.

**TAKE NOTE!**

Available information is likely to vary widely from one town to the next. If there are large information gaps, the advisors will need to recommend ways of creating such an information base and propose a workplan and budget for doing so. That may form part of the initial improvement activities, and should be considered part of the business planning process.

**STEP 1.5 – UNDERSTAND THE MARKET**

In parallel to the steps above, the Consultant/Advisor should seek to understand the market for water services in the town, i.e. currently service levels, sources and providers of water supply; how supply and demand are likely to evolve in the future. This should focus not only on those who receive services from the town utility but also on those who are currently not-covered, using their own water resources or relying on alternative providers. Where
appropriate, it may be that the town is treated as a number of zones in order to simplify market analysis.

<table>
<thead>
<tr>
<th>ACTIONS TO BE UNDERTAKEN BY THE CONSULTANT/ADVISOR</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify how town dwellers (in different zones) currently obtain water (and sanitation) services, whether from the utility or from on-site or alternative providers</td>
<td>Input into Initial Assessment Report Section on “Understand the Market”</td>
</tr>
<tr>
<td>• If several service providers are in operation, get information on their status and coverage</td>
<td></td>
</tr>
<tr>
<td>• Get information on service levels and tariffs for each service</td>
<td></td>
</tr>
<tr>
<td>• Analyse customer base of the town utility: identify main customer categories and income levels for each category</td>
<td></td>
</tr>
<tr>
<td>• Estimate willingness to connect and to pay for alternative service levels</td>
<td></td>
</tr>
<tr>
<td>• Evaluate current and future supply and demand balance</td>
<td></td>
</tr>
</tbody>
</table>

Module 1.5 gives you step-by-step guidance on what to look for to carry out this analysis.

**STEP 1.6 – IDENTIFY CRITICAL ISSUES AND PRIORITIZE INTERVENTIONS**

It will be necessary to draw all the threads of analysis together in order to identify the critical issues that the town is currently facing and prioritize the options for improvement.

Due to their limited resources, many small towns address WSS problems in a piecemeal approach, or through “crisis” management. Preparing a business plan allows towns to set priorities and phase in implementation—starting with activities that provide the most benefits for the least cost. To help prioritize interventions, simple financial models have been prepared that the town can use, with the assistance of a financial specialist, to identify the relative payoff (in terms of the impact on consumers and improved cash flows) from alternative interventions.

**TAKE NOTE!**
Care should be taken not to focus on a single tangible investment, such as developing a new source to address apparent water shortages without a full understanding of the business requirements. For example, addressing unaccounted for water may be a better short term intervention. Or if water supply is increased but registration, billing and cash collection issues have not been addressed, then much of the scope for overall business improvement will have been lost.

A first step for this prioritization exercise is to involve stakeholders (workshop) in discussing the findings from prior analysis (sub-steps 1.1 -1.5). The advisors should prepare a summary note to help the discussion and guide the town through those decisions, explaining the pros and cons of alternative options based on the analysis carried out in Step 1. For example, one of the purposes of the financial models is to help simplify and explain such options as an aid to discussion and decision making.

Following the workshop, the town (and its advisors) will prepare the Initial Assessment Report and action plan for Step 2. The report should be submitted to the financing entity (Central or Regional Government) in order to fulfil MoU conditions. The Executive Summary will be presented and discussed with town officials at the end of Step 1 or the start of Step 2.
### ACTIONS UNDERTAKEN – CONSULTANT/ADVISOR & TOWN

- Summarise critical issues for the town's water supply in a summary note for the Town's decision makers
- Define strategic objectives at a town-level workshop
- Identify possible physical investments to close supply-demand gap and meet required service levels and prioritize them
- Evaluate which skills need to be reinforced within the utility for implementing and managing proposed service improvements
- Formulate recommendations on improving institutional arrangements if they are not adequate
- Estimate available financing from internal & external sources to implement required improvements and evaluate gap

### OUTPUTS

- Initial Assessment Report and town-level workshop to identify:
  - Critical issues
  - Strategic objectives
  - Immediate improvements
  - Financing options
  - Action plan for Step 2

This is the key output from this Step.

See Section D for a proposed outline of the Initial Assessment Report.

### PRODUCING STEP 1 OUTPUT – INITIAL ASSESSMENT REPORT AND STEP 2 ACTION PLAN

The main objectives of the Initial Assessment Report are to:

- Summarize all existing information on the town's existing water supplies;
- Evaluate the town's ability to deliver the service and needs for improvements;
- Form a consensus on key areas for improvement at town level;
- Draw up an action plan for the business planning process and allocate responsibilities.

Preparing the Initial Assessment Report should take a maximum of 2 months from the start of Step 1. It will require drawing together all the threads of analysis conducted during Step 1, including institutional, technical and financial and economic analysis.

The outline presented in the table overleaf shows how the information gathered during Step 1 can be presented and summarised. Guidance for preparing each of the sections is provided in the accompanying modules. The information presented in the Initial Assessment Report should be refined and completed throughout the business planning process and later summarised in the business plan.

As this document runs the risk of being bulky and dense, it will be important that it be prefaced by an executive summary, which can be provided as a stand-alone document to decision-makers at town level. A simplified version of this summary, written in lay terms should also be prepared and distributed to town-dwellers for the purpose of consultation at the start of Step 2.

The last section of the Initial Assessment Report will consist of an Action Plan for conducting Step 2, i.e. for preparing the Business Plan itself. This Action Plan should achieve 4 main objectives:

- Set out a timetable for the Business Plan, with clear milestones and deliverables;
- Allocate responsibilities between the town and advisor (s);
- Define a consultation strategy: who should be consulted (inside or outside the town, including other towns (aggregation) or professional support services) and when;
- Prepare a plan to improve information systems and a budget for doing so.
Table 3 - Initial Assessment Report (IAR) Outline

<table>
<thead>
<tr>
<th>S. #</th>
<th>IAR - SECTION TITLE AND INDICATIVE CONTENT</th>
<th>M #</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><strong>EXECUTIVE SUMMARY – SHORT NOTE FOR DECISION MAKERS</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Critical issues faced by town: what are the current problems?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic objectives at town level: what do we want to improve?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sketch of proposed options for meeting strategic objectives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Action plan for Step 2 and allocation of responsibilities</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><strong>ASSESS THE INSTITUTIONAL ARRANGEMENTS</strong></td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Administrative perimeter of town: population and area size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Who does what at town level – allocation of town water functions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment of skills and organisational performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of institutional arrangements: need for reforms</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>UNDERSTAND THE UTILITY – TECHNICAL ASPECTS</strong></td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Town location and topography – brief description</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Map representing existing and potential sources of water, production, transport and distribution facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimated current production and potential future production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of wastewater management and sludge disposal</td>
<td></td>
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<tr>
<td></td>
<td>Evaluation of commercial performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of technical performance: technical efficiency ratios</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>UNDERSTAND THE UTILITY – FINANCIAL ASPECTS</strong></td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Evaluation of financial autonomy and cash position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment using selected financial indicators and financial statements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breakdown of income and expenditure items</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suggestions for improvements</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>UNDERSTAND THE MARKET</strong></td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Socio-economic context: population, household income, local economy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Charges; utility income; cash collected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consulting customers: surveys, focus groups etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline consumption assessment; affordability; willingness to pay</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>IDENTIFY CRITICAL ISSUES AND DEFINE STRATEGIC OBJECTIVES</strong></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Identify critical issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Define Strategic Objectives, which may include:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improving operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Making physical investments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reforming institutional arrangements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Building capacity and accessing professional support</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>ACTION PLAN FOR STEP 2</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Allocation of responsibilities between the town and advisors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identification of key items requiring consultation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proposed timetable for preparing the Business Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare plan to improve the information base</td>
<td></td>
</tr>
</tbody>
</table>
STEP 2 – PREPARE THE BUSINESS PLAN

In Step 2, the advisors will assist the town to define its strategy in key areas so as:

- To choose between alternative options in order to meet strategic objectives (this exercise will further consolidate step 1.6 results);
- To identify appropriate institutional arrangements (including grouping towns through aggregation or market consolidation) and select appropriate ways to receive professional support (step 2.1);
- To draft a Business Plan setting out how the town intents to meet strategic objectives (step 2.2 including investment, management and operations, and financing plans).

**TAKE NOTE!**
This Step is likely to require a lot of iteration and discussion with external actors, particularly if contracting or aggregation is envisaged. If finalising options is likely to take too long, identify in the Business Plan what can be done straight away and what can be done at a later stage once agreement has been reached with those external actors.

STEP 2.1 FORMULATE CHOICES ON SOURCES OF PROFESSIONAL SUPPORT

Having identified and prioritized critical issues and potential solutions in step 1.6, towns will need to answer the following questions:

- What is the most appropriate institutional arrangement for the town: independent utility or joint utility serving several towns?
- What skills are required to deliver the necessary improvements?
- Can in house capacity be strengthened by providing training, or will it be necessary to outsource some functions?
- Are the skills (either for training or for service provision) available locally and, if so, at what cost?

Identifying institutional arrangements may be a straight forward process— if a town opts to remain independent, could require some level of consultation, if market consolidation is to be achieved by allowing a single operator to manage more than one towns water supply; or could require institutional reforms— if it is decided to aggregate the services of multiple towns under a single entity.

The decision to remain independent or to consolidate operations with other towns, should be made before choosing professional support options, as this will obviously affect the choice. Various professional support options have been used successfully in different countries. Their application depends on the needs of the small town, and on the sources of financing, i.e. whether the support can be financed by utility revenues, by government or by non-profit organizations.

**TAKE NOTE!**
If aggregation with neighbouring towns is seen as an attractive option up-stream in the process it will be necessary to contact neighbouring towns to understand their own circumstances and assess their interest for aggregation. The analysis of support options would therefore be carried out for the group of towns rather than for each town separately, although the circumstances in each town should be clearly distinguished.

The basic options for small towns are to build in house capability, or to outsource:
• In house: the town utility can seek to build up its own capacities through relying on support organisations (such as Help Desk / Outreach Training Programmes, NGO Technical Assistance Providers, or Regional Associations) or joining with neighbouring towns to increase the scale of operations (what is referred to as aggregation);

• Outsource: the town can purchase professional support services, either from a routine operator for routine services with purchase of periodic, specialist services, or from a full-service operator (capable of providing both routine and specialist services).

**TAKE NOTE!**
Depending on the professional support option selected, discussions with external parties may need to be initiated at the beginning of Step 2 to ensure their collaboration further down the line. Advisors can initiate discussions with external parties, such as neighbouring towns or potential operators with a nominated town representative.

<table>
<thead>
<tr>
<th>ACTIONS TO BE UNDERTAKEN</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If town is independent:</td>
<td>If aggregation an option:</td>
</tr>
<tr>
<td>o Help identify sources of support, potentially from NGOs or government organisations</td>
<td>• A <strong>workshop</strong> with candidate towns</td>
</tr>
<tr>
<td>• If aggregation is an option:</td>
<td>• <strong>Inputs into Business Plan</strong> from other towns</td>
</tr>
<tr>
<td>o Initiate discussions with potential candidate towns</td>
<td>*If contracting out an option, a <strong>note</strong> with:</td>
</tr>
<tr>
<td>o Evaluate situation in each town</td>
<td>• Operational functions to be contracted out</td>
</tr>
<tr>
<td>o Organise workshop with all candidate towns</td>
<td>• Potential operators and specialist service providers</td>
</tr>
<tr>
<td>• If agreement about aggregation:</td>
<td>• <strong>Inputs into Business Plan</strong></td>
</tr>
<tr>
<td>o Collect additional information from other towns</td>
<td>This will form the <strong>basis for preparing contracts and recruiting service providers</strong></td>
</tr>
<tr>
<td>• If contracting is an option (for town or aggregated entity):</td>
<td></td>
</tr>
<tr>
<td>o Agree which operational functions to be contracted out</td>
<td></td>
</tr>
<tr>
<td>o Initiate discussion with potential operators and specialist service providers</td>
<td></td>
</tr>
</tbody>
</table>

*See Module 2.1 on options for specialist services support and aggregation.*

*See Module 3.1 on preparing contracts.*

Note that the question of professional support is also important for the Government to consider because when there are many small towns that require assistance, the support options may need to be institutionalized at the state level.

---

**STEP 2.2 DRAW UP INVESTMENT, MANAGEMENT AND OPERATIONS, AND FINANCING PLANS, AND PREPARE THE BUSINESS PLAN**

In drawing up an investment plan and management and operations plan, the town will be encouraged to identify easily realizable benefits (quick wins) that improve the utility and its service delivery. The purpose of identifying quick wins will be to demonstrate to the operator’s employees, customers and ultimately future investors that change for the better is possible and ultimately sustainable. For longer-term options, the town will need to take account of cost-effective design principles and seek to achieve maximum operating efficiency in order to reduce the costs of delivering the service. A modular approach to
planning investments, should also be adopted so as to reduce the risk of over-design and ensure that consumers’ are able to pay for services, particularly in initial years.

A critical part of this stage of the work will be to test proposals against financial viability through application of the financial models, and to evaluate proposals against the willingness and ability to pay of end users. If necessary, plans may need to be revised to ensure that they are viable and acceptable.

<table>
<thead>
<tr>
<th>ACTIONS TO BE UNDERTAKEN</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prepare Investment Plan for town or aggregated entity</td>
<td><strong>Inputs to Business Plan:</strong></td>
</tr>
<tr>
<td>• Prepare corresponding Management and Operation Plan</td>
<td>• Investment Plan</td>
</tr>
<tr>
<td>• Prepare corresponding Financing Plan</td>
<td>• Operations Plan</td>
</tr>
<tr>
<td>• Test viability and acceptability.</td>
<td>• Financing Plan</td>
</tr>
<tr>
<td>• <em>If</em> Investment Plan &amp; Operation Plans are not financially viable, go back to Step 2.1</td>
<td></td>
</tr>
<tr>
<td>and explore alternative options for professional support and investment</td>
<td></td>
</tr>
</tbody>
</table>

See Module 2.2 on how to put those plans together

### Producing Step 2 Output – The Business Plan

A proposed outline for the business plan is presented in Table 4 below. Details about what should be laid out in each section of the business plan are presented in Module 2.2.

**Table 4 - Business Plan Outline**

<table>
<thead>
<tr>
<th>BP S#</th>
<th>BUSINESS PLAN - SECTION TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td><strong>EXECUTIVE SUMMARY</strong></td>
</tr>
<tr>
<td></td>
<td>Concise overview presenting key points, including objectives</td>
</tr>
<tr>
<td>II</td>
<td><strong>STATEMENT OF GOALS</strong></td>
</tr>
<tr>
<td></td>
<td>Goals, critical issues and benefits to the community</td>
</tr>
<tr>
<td>III</td>
<td><strong>DESCRIPTION OF THE UTILITY AND MARKET ENVIRONMENT</strong></td>
</tr>
<tr>
<td></td>
<td>Summary of Initial Assessment Report sections on the institutional assessment, understanding the utility and the market.</td>
</tr>
<tr>
<td>IV</td>
<td><strong>TOWN UTILITY’S STRATEGY</strong></td>
</tr>
<tr>
<td></td>
<td>Details on how the utility will achieve its goals, including specified tasks, a timeframe (e.g. 5 year business plan), milestones and performance targets, the skills needed and the plan to access them, and specified roles and responsibilities.</td>
</tr>
<tr>
<td>V</td>
<td><strong>INVESTMENT AND FINANCING PLANS</strong></td>
</tr>
<tr>
<td></td>
<td>Prioritized investments, costs and how to finance them.</td>
</tr>
<tr>
<td>VI</td>
<td><strong>MANAGEMENT AND OPERATIONS PLAN</strong></td>
</tr>
<tr>
<td></td>
<td>In house and outsourced arrangements to manage and operate facilities, including contract details, operational performance targets, and reporting arrangements, as well as training programmes.</td>
</tr>
<tr>
<td>VII</td>
<td><strong>FINANCIAL FORECASTS</strong></td>
</tr>
<tr>
<td></td>
<td>Financial forecasts from the (town water) financial model (TWFM).</td>
</tr>
</tbody>
</table>
Specify the form that communication will take, and key messages to be delivered.

**TAKE NOTE!**

**WHAT SUPPORTING DOCUMENTS SHOULD YOU SUBMIT?**

Business plans submitted to financiers in a private sector context would generally contain supporting documentation. In the case of a town utility, it may not be necessary to attach those documents so as to keep the business plan lean, but the business planning process should provide a good opportunity to organise the town utility’s key records so as to make them easier to find in future, such as:

- Legal documents for the utility’s initial registration and formation.
- Legal documents showing its present legal status.
- Maps of location and service areas.
- Copies of any leases or contracts with external operators.
- Organizational chart with relevant résumés.
- Asset inventory, descriptions of assets and documents related to any liabilities.
- Records showing past performances.
- Financial statements.

**TAKE NOTE!**

**WHAT IS TO BE DONE AFTER THE BUSINESS PLAN IS WRITTEN?**

The following aspects should be reviewed:

- Is the document complete? Are all the sections present?
- Should any additional supporting documents be included?
- Is it too long or too short?
- Are some sections too beefy and others too thin creating an imbalance?
- Is the content succinct?
- If written by different authors, has it been edited to provide continuous style?
- Is it understandable: does it flow, is it easy to understand?
- Is it well formatted?
- Is the message clear, positive and focused for the targeted audience?
- Is the business plan compelling?

**STEP 3 – FORMALIZE RELATIONSHIPS AND IMPLEMENT ARRANGEMENTS**

In this final Step, the Advisors will assist the town to formalize all of the arrangements that are necessary in order to make the implementation of the business plan feasible and to monitor such implementation. These could include:

- The signing of contracts with professional support providers (such as a routine operator and specialist services or a full-service operator);
- The revision of institutional arrangements to oversee the contracts (through the creation or strengthening of a corporate oversight body, at town level or for several towns in the event of aggregation);
- The establishment of a monitoring and evaluation framework in order to verify implementation. Such M&E framework could be used, in particular, by an entity providing financing in order to release additional tranches of funding linked to improvements.

**TAKE NOTE!**

This Step is critical to ensure that all inputs into the business plan are consolidated on a firm contractual basis. It may be, for example, that critical parameters are only known
after a bidding process has taken place, and that those would influence the financing package that can be put together. Therefore, the business plan may need to be adjusted at the end of this step, depending on the outcome of negotiations with parties.

**TAKE NOTE!**
Monitoring tools are a critical element of the business planning process. They enable financiers to track performance and may be used to trigger the release of additional resources in accordance with the MoU. Monitoring capacity will need to be strengthened at town level (to gather and present data periodically) and at central/regional government level (to monitor progress against indicators set out in the business plan).

<table>
<thead>
<tr>
<th>STEPS 3.1 AND 3.2 PREPARE OPERATOR CONTRACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If outsourcing is the chosen option for obtaining professional support, the process of recruiting a professional operator, and / or specialist service providers should be elaborated by the Town’s advisors. Depending on the size of the contract and the number of providers potentially interested, a competitive recruitment process is preferable. If it appears that there is little interest from skilled service providers or that they lack the required competencies, the advisor (s) may assist the town to seek professional support through other channels including the central government or NGOs.</td>
</tr>
</tbody>
</table>

**TAKE NOTE!**
The probability of obtaining such support in the short-term is relatively low so the consultant/advisor would also need to recommend alternative strategies in case such support is not forthcoming.

Operational functions to be outsourced should be clearly linked to the business plan. Professional support may therefore need to be phased over time, with increasing responsibility delegated to operators as and when necessary. To do so contracts must have a sound legal basis and a mechanism for contractual adjustment. Contracts should also set out services to be provided and performance targets to be met (a performance standards chart), and include an incentive compensation chart and remuneration formula (annexed as schedules to the contract).

<table>
<thead>
<tr>
<th>ACTIONS UNDERTAKEN BY TOWN &amp; CONSULTANT/ADVISOR</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Agree on operational functions to be delegated, performance targets and terms of compensation as linked to the Business Plan</td>
<td>Contract signed with providers OR Request for support submitted to central/regional government</td>
</tr>
<tr>
<td>• Obtain feedback from prospective contractors</td>
<td></td>
</tr>
<tr>
<td>• If several providers exist, organise competitive tender and select best offer</td>
<td></td>
</tr>
<tr>
<td>• If only one service provider exists or none: negotiate terms with existing provider OR seek support from central/regional government</td>
<td></td>
</tr>
</tbody>
</table>

⇌ See Modules 2.1 on professional support, and 3.1 and 3.2 on contracting.
A monitoring and evaluation framework should be established in order to assess overall progress in implementing the business plan; the performance of the oversight body as well as performance of operators and specialist service providers; and it’s eligibility for financing. Indicators may be either of a pass / fail type (for example, sub-project milestones that must be met as a condition of financing), or numeric (for example, relating to technical or financial operational performance).

In cases where external financing is an important condition for delivering planned improvements, it will be important to agree with the financing body or government facilitator the required level of performance or achievement of sub-project milestones to unlock financing. The advisors will need to ensure that business plans are orientated to meeting these necessary conditions.

By the end of the business planning process systems should be in place for collection of key information needed for determining baseline and benchmarking data necessary for monitoring performance.

<table>
<thead>
<tr>
<th>ACTIONS UNDERTAKEN BY TOWN &amp; CONSULTANT/ADVISOR</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If financing required from central/regional government</td>
<td>Key performance indicators</td>
</tr>
<tr>
<td>o Agree on levels of performance and / or sub-project milestones that will unlock financing and define a monitoring and evaluation framework</td>
<td>Financing agreement including financing and monitoring arrangements</td>
</tr>
<tr>
<td>o Agree on any other conditionality, on both sides</td>
<td></td>
</tr>
<tr>
<td>o Finalise Performance Contract, including financing and monitoring arrangements</td>
<td></td>
</tr>
<tr>
<td>• For operator or specialist services contracts, agree on performance standards and incentive compensation</td>
<td></td>
</tr>
</tbody>
</table>

See Module 3.3 on designing a Monitoring & Evaluation framework, including the “stepped approach” with reform- and performance-based financing.

The final Step consists of finalizing the business plan to incorporate the results of all the processes carried out in Step 3— which may have led to changes in the assumptions. The business plan should be considered a “live” planning and management tool, to help the utility monitor progress against its stated objectives. It should be updated at regular intervals.
## ANNEX A – GLOSSARY

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisor</td>
<td>The specialist or team of specialists who will assist the town through the process of business planning. The advisor(s) may be a consultant(s) or staff member(s) of a regional or national government agency assigned to carry out this role. A combination of these options may also be used.</td>
</tr>
</tbody>
</table>
| Affermage             | A type of private sector participation contract under which the operator operates and maintains the assets at its own expense but does not finance investment in infrastructure assets. The operator’s remuneration can be determined in two ways, with a different impact on the allocation of commercial risk:  
  - The operator may receive a fixed remuneration per unit of water sold. The difference between tariff revenues and this remuneration goes back to the asset-holder. The operator is shielded from the commercial risk in that case.  
  - The operator may pay a lease fee for use of the assets to the asset-holder and retain the difference between tariff revenues and the lease fee. The operator is exposed to greater commercial risk. |
<p>| Aggregation           | A process whereby towns group together as one administrative unit to supply water services over their territory (also referred to as “clustering”). The aggregated unit may employ staff to supply the service or contract an operator. Potential benefits include economies of scale and sharing of water facilities. |
| Alternative provider  | A service provider, other than the town utility, which supplies water services in the town alongside the utility. Includes water vendors, water truckers and cesspit-emptiers. Often in the informal sector. |
| Apex organization     | A self-standing organization which is owned by municipalities to which it provides professional support services. |
| Articles of association| A document setting out the Corporate Oversight Body’s organization, including its name, objectives, members’ rights and obligations, internal regulations, bye-laws covering procedure, meetings, shares, and nomination and role of directors. |
| Asset-holder          | The institution which owns the assets and performs asset-holding functions, including: owning the assets and managing their development; servicing the debt and identifying financing; planning and carrying out long-term investments and letting contract for services if they are related to investments. |
| Base costs            | Estimate of costs at constant prices excluding physical and price contingencies. Base costs include any applicable taxes and duties, but these should be separately identified if (as is typically the case) lenders and donors will not finance them. |
| Benchmarking          | Comparing an organization’s performance with that of similar |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT</td>
<td>Originally, Build-Operate-Transfer, but now used to denote a family of private sector contracts under which the operator is in charge of designing, building and operating a single facility or group of assets. Typically used for developing a new water source or building a wastewater treatment plant.</td>
</tr>
<tr>
<td>Business Plan</td>
<td>The document that sets out the town utility’s development strategy over the next 5 years, based over a longer term planning horizon. This can be used as a basis to identify performance targets.</td>
</tr>
<tr>
<td>Business Planning</td>
<td>The process of outlining how the utility will develop over time to provide the level of service required by its customers, owners and regulators.</td>
</tr>
<tr>
<td>Cash flow</td>
<td>Cash collected less cash disbursed during a defined period. Operating cash flow arises solely from operations and excludes any capital expenditure. Prefinancing cash flow is operating cash flow less capital expenditure.</td>
</tr>
<tr>
<td>Concession</td>
<td>A type of private sector participation contract under which the operator is responsible for financing and managing investment, as well as operating and maintaining the utility. The operator is remunerated from tariff revenues, minus a concession fee if applicable.</td>
</tr>
<tr>
<td>Constant prices</td>
<td>Prices that exclude the effects of inflation. To be meaningful, must include a date, e.g. constant 2005 prices. Also known as real terms. See also current prices.</td>
</tr>
<tr>
<td>Contingencies</td>
<td>Amounts added to base costs to take into account physical contingencies (e.g. uncertainty arising from unanticipated ground conditions or changes in design) and price contingencies (typically comprising inflation, the effects of exchange rate movements and lenders' fees and charges, if any).</td>
</tr>
<tr>
<td>Contract</td>
<td>A generic term for a contract signed between the town oversight body and an operator or a professional service provider to delegate management of a service provision function.</td>
</tr>
<tr>
<td>Corporate oversight body</td>
<td>The entity in charge of supervising the town operator, including of providing overall direction to the management of the operator, approving budgets and business plans and performing other duties as defined in the articles of incorporation (or association?) and national laws. [Cledan?]. This may take different names depending on the country, such as the Board of Directors of the Water Authority in Tanzania.</td>
</tr>
<tr>
<td>Cost-effective design</td>
<td>Cost effective design is design that makes the most effective use of available resources, bearing in mind the likely rate of increase in demand for water supply and sanitation services, the availability of financial resources and the physical characteristics of system components.</td>
</tr>
<tr>
<td>Cost recovery</td>
<td>The recovery of the costs of providing a service from the users of the service. Full cost recovery implies charging users not only for day to day operating expenses, but also for the depreciation</td>
</tr>
</tbody>
</table>
Charges arising from the use of fixed assets. Financing costs are also sometimes included in full cost recovery.

**Creditor**
Party owed money by the utility, typically suppliers (trade creditors) and lenders. Amounts owed are a current liability and are a balance sheet item. (U.S: accounts payable).

**Current prices**
Prices that include the effects of inflation, i.e. represent the amount that would actually be spent or received on the date specified. Also referred to as nominal prices. See also constant prices.

**Debtor**
Party owing money to the utility, typically water users (trade debtors). Amounts due by debtors are a current asset and are a balance sheet item. (U.S: accounts receivable).

**Depreciation charge**
An amount representing the wear and tear on a fixed asset during a defined period. It is charged against income.

**Discount rate**
A percentage that represents the premium placed on money now versus money in one period’s time. Discount rates are usually expressed in real terms, i.e. they exclude inflation.

**Economies of scale**
Savings realized when average costs of production decline as more of a service is provided. Water and sewage treatment both display scale economies: unit costs fall as output rises provided capacity matches output.

**Economies of scope**
Savings realized when the cost of providing two or more services together (such as water and sanitation) is less than the cost of providing them separately.

**Economic regulation**
A water sector function that strives to balance the goals of efficient performance and consumer protection. In practice, it consists of setting, monitoring and enforcing water tariffs and service standards. It can be broken down in four functions: regulation of price, service quality and competition and consumer protection.

**Environmental regulation**
A water sector function consisting of regulating water abstractions and discharges back to the environment so as to manage resources in a sustainable manner.

**Franchise**
Under a franchise arrangement, a local independent operator (franchisee) receives specialist services support from a franchisor in exchange for a fee – effectively making the routine operator a full-service operator.

**Franchisor**
A franchisor provides its own branded package of support services to a franchisee in exchange for an upfront charge for training, and a small ongoing fee based as a percentage of the operator’s revenues.

**Franchisee**
A local independent operator who receives a package of support services from a franchisor.

**Full service operator**
An operator capable of providing all professional support services to a town utility, including routine and specialist services.

**Income**
The amount of money falling due to a *service provider* in exchange for the supply of services over a defined period. May include income from connection charges. Also known as revenue or turnover, but
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management contract</td>
<td>A type of private sector participation contract under which the operator provides management services to a service provider in return for a fee. This fee may be fixed or partially based on performance results.</td>
</tr>
<tr>
<td>Market consolidation</td>
<td>A process by which successful routine operators develop their business by expanding to other towns as full service operator and operate numerous town supplies through individual contracts. This can achieve similar economies of scale as aggregation.</td>
</tr>
<tr>
<td>Memorandum of Understanding</td>
<td>A preliminary agreement of cooperation between organizations defining the roles and responsibilities of each party. This refers here to the document setting out the obligations of the national government, the municipality and the water utility for business planning.</td>
</tr>
<tr>
<td>Municipality</td>
<td>Town-level government. This may take different names depending on the country, such as District Council (in Tanzania) or local body in India.</td>
</tr>
<tr>
<td>National government</td>
<td>Government institution involved in the water sector at national level. Typically, this would be the Water Ministry, which would be in charge of defining national policies and channelling financing to the sector.</td>
</tr>
<tr>
<td>National policies</td>
<td>Documents setting out main policy decisions formulated by the national government, including coverage targets and overall organisation of the water sector.</td>
</tr>
<tr>
<td>OBA</td>
<td>Output-based aid. A way of providing subsidies based on outputs rather than on inputs. Typically applied for financing coverage extensions or temporary operating deficits.</td>
</tr>
<tr>
<td>Operator</td>
<td>An entity responsible for the day-to-day operations of the utility under alternative contractual forms (including performance, management, affermage or concession contracts).</td>
</tr>
<tr>
<td>Performance contract</td>
<td>A contract signed between the national government and the municipality setting out targets for improvement in the town utility's performance in exchange for financing.</td>
</tr>
<tr>
<td>Policy making</td>
<td>A water sector function consisting of setting long term sector goals and formulating key choices regarding reform, types of water sources, treatment levels or coverage objectives.</td>
</tr>
<tr>
<td>Present value</td>
<td>The present value (PV) of a future sum (or sums) represents today's exchange value of that future sum, given a market interest rate or a specified discount rate. The net present value (NPV) is the difference between the PV of income (or benefits) and the PV of expenses.</td>
</tr>
<tr>
<td>Professional support</td>
<td>External assistance provided for assisting with or carrying out one or several town water sector functions.</td>
</tr>
<tr>
<td>Professional support provider</td>
<td>An entity providing professional support services to the town’s utility. Professional support providers may include: (i) consulting engineers and financial advisors (ii) operators through a contract; (iii) umbrella organizations such as NGOs or Apex organization; (iv)</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
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<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Public health regulation</strong></td>
<td>A water sector function consisting of setting and monitoring the enforcement of drinking water and related health standards.</td>
</tr>
<tr>
<td><strong>Regulation</strong></td>
<td>A water sector function consisting of ensuring that the water utility complies with existing rules and regulations with respect to tariffs or quality standards and of adapting those rules overtime in order to cope with unforeseen events.</td>
</tr>
<tr>
<td><strong>Regulatory oversight body</strong></td>
<td>The entity in charge of regulating the utility.</td>
</tr>
<tr>
<td><strong>Routine operator</strong></td>
<td>An operator capable of carrying out routine tasks, and so requires the support of specialists to efficiently operate the system, to resolve problems, and plan expansion.</td>
</tr>
<tr>
<td><strong>Service contract</strong></td>
<td>A contract under which a company provides selected services (such as meter reading or billing and collection, but not management) to a water utility in return for a fee.</td>
</tr>
<tr>
<td><strong>Service provider</strong></td>
<td>An entity providing water and sanitation services. In a town, this may include the town operator and/or alternative providers.</td>
</tr>
<tr>
<td><strong>Specialist services</strong></td>
<td>Advisory services related to business planning, efficiency improvement, expansion or regulation.</td>
</tr>
<tr>
<td><strong>Stock</strong></td>
<td>Supplies that are used in production, e.g. chemicals, spare parts. (U.S: inventory)</td>
</tr>
<tr>
<td><strong>Tariff structure</strong></td>
<td>The relationship between the price charged for water and some characteristic of the consumer. For example, a rising block structure applies a different price per unit volume depending on the quantity bought in a given time period.</td>
</tr>
<tr>
<td><strong>Town</strong></td>
<td>A population centre that is larger than a village and smaller than a city, typically which are comprised between 2,000 and 200,000 inhabitants. The Manual focuses on towns that fall in the so-called water supply &quot;management gap&quot;, comprising between 2,000 and 50,000 inhabitants.</td>
</tr>
<tr>
<td><strong>Town utility</strong></td>
<td>The main provider of water and sanitation services within the town’s territory. The term utility is taken as synonymous with a dedicated group of people and functions concerned with corporate oversight and operations, e.g. a town water board and operator. This refers to the business as a whole rather than to the management model or type of operator.</td>
</tr>
<tr>
<td><strong>Water services</strong></td>
<td>The provision of water and sanitation services, including the delivery of potable water to customers and the collection and treatment of wastewater.</td>
</tr>
<tr>
<td><strong>Water Board</strong></td>
<td>A type of oversight body for a town water supply.</td>
</tr>
<tr>
<td><strong>Water tariffs</strong></td>
<td>The price of water to a final consumer.</td>
</tr>
<tr>
<td><strong>Working capital</strong></td>
<td>Current assets less current liabilities. A working capital increase is associated with a fall in operating cash flow, other things being equal.</td>
</tr>
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</table>
Business Planning for Town Water Services

Module 0
Foundations for Town Water Supply

Bank Netherlands Water Partnership
Project #043

Town Water Supply and Sanitation Initiative
The World Bank Group
Washington, DC
0.1. THE TOWN CHALLENGE AND PRINCIPLES FOR OVERCOMING THE CHALLENGE

This section gives a rapid overview of the town water supply challenge and outlines principles for a successful water supply strategy. It argues that adopting a business planning approach can help implementing those principles in a structured manner.

Module content
- Estimating the scale of the town water supply challenge
- Principles for successful water services
- Town water services, introduction to the business planning approach

0.1.1 THE SCALE OF THE TOWN’S CHALLENGE

Adequate water supply and sanitation services are key to a town’s prosperity. But service provision in towns in many countries has generally been poor, most often characterized by “one-time” government hand-outs for rehabilitation or expansion, followed by long periods of deterioration.

Why is town water supply a specific challenge?

Towns cannot use the urban utility model or the rural community management model to achieve success in service delivery – there is a need for some other solution. There are a number of reasons for this:

No specific technical solutions. Towns have both rural and urban characteristics, but neither the urban nor the rural model to service delivery is appropriate to their needs. There is demand for piped water supply, but the financial and professional resources in towns are too limited to support the longer planning horizons that are typical of urban systems, and the needs of urbanized areas exceed rural solutions.

Limited revenue base. Towns usually do not have big commercial and industrial clients that can generate financial resources to supplement income generated from residential customers. The common (often misplaced) conception is also that town dwellers are not able to pay for water supply, hence there is often an unwillingness to charge for water services by local politicians resulting in low tariffs.

Limited human resource capacities. Town water supplies require management skills that exceed “rural” community-based management approaches, but are too small to support standard “urban” utility approaches which require sufficient revenues to support a full complement of professional staff, and the potential for full cost recovery. As a result, they would usually find it difficult to attract and retain good people, particularly once they have been trained and can look for employment elsewhere.

Limited control by towns over their activities. In an effort to improve inadequate service provision, national governments have often decentralized the sector, giving towns the responsibility for service delivery. Unfortunately, decentralization often does not include the concurrent delegation of authority to take the steps necessary to implement service improvements and raise revenues.
What is the scale of the challenge?

Towns account for a third of world population and their population will double in the next 15 years. Between twenty and forty percent of the population in African and Asian countries live in towns of between 2,000 and 200,000 people. As villages grow and develop to become towns, and as towns grow in size, the number of people living in towns in Africa, Asia as well as Latin America is expected to double within fifteen years, and double again within thirty. It is expected that the current 60% rural – 40% urban split in Africa and Asia will shift to the current 25% rural – 75% urban split found in Europe and the Americas. Much of this anticipated shift will result from the growth of towns, although the growth pattern of each particular town is unpredictable.

There is a very high number of small towns. Typically, for every large town (more than 100,000 population) there are 2-3 medium-sized towns (less than 50,000 population) and about 8-10 small towns (less than 20,000 population) but there are an equal number of people living in each size-class. This means that Governments need to devote their attention to a great number of towns. Decentralization helps shifting management responsibilities to the local level but it is not always accompanied by the right level of revenue transfer. International or national experts based in the capital city are simply too expensive to provide support to so many towns and there are often not enough local experts at the regional level to provide such support.

What are common problems with town water supply?

Inadequate technical planning. In traditional project based approaches to town water supply, systems have been designed and built by the Government and handed over to the town on completion. Design has often been restricted to technical, economic and financial feasibility studies prepared by engineering consultants or utility staff based on prescribed national demand/design standards to meet projected demands for 20 to 25 years. The resulting systems are often expensive to construct and operate and, as a result, end up providing piped service to only a small portion of the population who can afford to have their own connections. This problem is more pronounced in towns with smaller and often more homogeneous population and, therefore, less opportunity for economies of scale and cross subsidies. Standard designs applied in larger urban centres may be unaffordable or simply unnecessary to the current population in towns, in terms of physical scale, investment cost and ongoing operation and maintenance obligations.

Lack of consultation at town level. This type of planning is often carried out without adequate stakeholder consultation: if those who inherit the management of a water supply system have not been involved in its design and do not understand the choices made or what is required for sustainability, they may be reluctant or unable to maintain tariffs at a level required to cover costs, to pay for adequate maintenance or to retain qualified staff and contract for professional support. When systems are designed and constructed by a government institution and handed over to the town, together with heavy financial liabilities, the town will be reluctant to take over operation and maintenance of the system.

Lack of funds to finance ongoing costs. In the early years of their development or after a major expansion of facilities, town water utilities often have difficulty generating sufficient revenues to cover costs. Fixed costs associated with debt service and overheads must be paid from the start, but often the customer base and, therefore, demand for water and revenues take some time to grow to a level that can support these costs. Positive cash flow
may never be achieved if systems are over-designed, or if grant financing is not available at
start-up where construction costs are high and revenues are low. Even where design
matches short-term demand, it takes time for revenues to increase to cover costs.

**Figure 1 – The start-up dilemma**

![](image)

**Demand risk.** Towns, particularly small ones, that install full service piped water systems for
the first time, face several problems linked to demand risk:

- Customers supplied with water from their own wells may be reluctant to abandon them
  and pay for an unproven service, especially if the quality of the well water is acceptable;
- Low income consumers and immigrants from rural areas previously supplied by wells or
  standpipes, are not accustomed to pay for water and may be reluctant to pay;
- Customers may give priority to other needs in allocating their limited resources and not
  support water and sanitation investments;
- There is often considerable uncertainty as to future growth patterns for the town.

As a result of all these factors, towns are often confronted with a cycle of deteriorating
service (see Figure 2) and are unable to generate sufficient revenues in order to get out of
the cycle.

**Figure 2 – The cycle of deteriorating town water supply services**
0.1.2 Principles for Successful Town Water Services

Successful town water supply services need to overcome these common problems. They can do so by following a number of basic key principles outlined below.

- Be responsive to demand
- Design and operations should be cost effective
- Expansion should reflect real changes in demand
- Management should be transparent and accountable
- Towns should have access to adequate professional support services

**Services should be responsive to demand.** The basic goal of town water supply should be to offer services that all types of customers want and are ready to pay for. Increasing the revenue base by providing house connections to customers that can afford a better quality of service is particularly important and there is mounting evidence that town dwellers want domestic connections and are willing to pay for them. At the system level, demand responsive approaches lead to higher cost recovery, ensuring sustainability and allowing further development. In the town context, offering different options can come down to the kind of connection offered: a private house connection, a shared connection, a yard tap, or a kiosk.

**System design and operations should be cost effective.** The technical design and the operations and management plan for the town utility must reflect local conditions, capacity and culture, and match consumers’ expectations in terms of service levels and affordability rather than imported standards that may be inappropriate and excessively costly. The community should be provided with information needed to make informed choices about technical options, management models and professional support.
Expansion should reflect real changes in demand. Towns should plan for the current population, but should also plan to gradually expand the system based on observed demand, with a ‘modular’ approach to design and sequential service upgrades to match demand evolution, including water consumption and consumers’ ability to pay. Such a phased or ‘modular’ approach is recommended for towns, because it minimizes the gap between system costs and revenues, and so improves cash flows and financial sustainability. A carefully designed connection policy is also important to ensure that everyone is provided with a service they can afford, and that the utility is able to build up its revenue base as rapidly as possible.

Towns should have the ability to expand to meet growth in population and demand. Expansion is essential for a successful town water supply. This serves to meet the water demand of a growing population, and to raise the revenues needed to meet cost recovery objectives. Facilitating factors for system expansion include: (i) access to adequate water resources, (ii) a stable legal framework to allow a fair return on investments, (iii) limited administrative barriers related to service areas, (iv) access to technical and financial expertise, and, (v) incentives for expansion built in operators’ contracts.

Tariffs should be sufficient to cover costs. It is not always feasible or even desirable to impose a full cost recovery goal for tariff income. Instead there should be a progressively more demanding goal. This should be set in context, depending on existing levels of cost recovery, household income etc. One approach would be to start with a goal of meeting all cash expenditure plus creating a reserve able to finance replacement of the shortest life assets and gradually increase the level of cost recovery as asset replacement requirements become clearer.

Town water services should be managed in an autonomous manner. Management decisions should be based on what is best to provide good quality, affordable water to expanding communities, and that revenues are not diverted to other uses, even if it may benefit the town. Utility operators should be able to hire/fire staff, set attractive salaries, offer performance incentives, disconnect both public and private non-payers, and be free to improve and extend services. Revenues should be ring fenced, and reinvested in the town to pay salaries, operate/maintain facilities, and expand the system.

Management of town water services should be transparent and accountable. Transparency and accountability are essential to gain and maintain the trust of users and investors. They are founded on: (i) clear roles and responsibilities, (ii) independent audit and monitoring, (iii) disclosure of information and (iv) consultation with consumers. They are particularly important in situations where there is a monopoly in service provision. Arms length, written agreements between the Corporate Oversight Body (e.g. Water Board) and the operator improve transparency and accountability, eliminate the conflict of interest that exists when a Corporate Oversight Body supervises its own staff, and provide a means of introducing incentives for good performance. Similarly, regulatory (e.g. town council) and corporate oversight functions should be separated.

Towns need to have access to adequate professional services. The fatal mistake that most towns make is to underestimate what’s required to successfully manage their water supply facilities, and to assume that they can do it alone. Experienced professionals are needed to operate town water supplies efficiently and to expand them to keep up with a
growing population. What’s required are skilled operators to perform routine operations, plus specialists to formulate and guide efficiency improvement programs and to handle the technical and financial aspects of system expansion. The challenge is to secure these services given a small revenue base and limited human resources. Innovative ways must be found to share the services of scarce, relatively expensive specialists between towns.

**External professional support may help towns to achieve their objectives.** Towns may be too small to achieve economies of scale or they may be unable to attract technical and managerial skills needed to improve efficiency and expand service on a permanent basis. In such cases, towns will have to explore options to share some or all regulatory and service delivery functions with other towns, and / or contract external professional support (individuals or companies) to help regulate or operate services.

**Contracting (internally or with external providers) can be used to clarify incentives.** Provision of water services in towns is often hampered by a lack of direction, trying to achieve multiple and conflicting objectives, and routine political interference in day to day operations. Contracts are a vehicle which can start to address many of these issues. In particular, they support improved governance because they help to increase autonomy, introduce competition and innovation, define roles and responsibilities, set incentives for good performance, identify meaningful performance targets, and fulfil the achievement of social objectives. Internal (Performance) Contracts are a valuable tool to improve and monitor staff performance within the service provider. External contracts buy in services from consultants and contractors to provide towns with the flexibility they need to successfully serve their population, regardless of the capacity of the town’s own staff to perform tasks, or oversee the service provider.

In sum, towns should take on more responsibilities for planning and managing their water supply services, through (a) designing and implementing technical alternatives and cost recovery mechanisms that lead to financially viable services that customers want and are willing to pay for and (b) putting in place appropriate institutional arrangements to oversee and manage the service in a sustainable manner in order to adapt the service to town growth and unexpected events.
0.2. - **PRINCIPLES FOR ANALYSING TOWN WATER SECTOR FUNCTIONS**

The purpose of this module is to present the water sector functions that need to be carried out at town level for successful delivery of water supply services. This is important in order to help towns evaluate how well those water sector functions are carried out and how they can be improved, through building capacity or accessing professional support.

The module then considers in more detail the three functions that impact directly on utility performance (operations, corporate oversight and regulatory oversight). For each of these, it identifies the tasks or sub-functions that are most important for towns. This provides the basis for the check-list for institutional assessment contained in Module 1.2. On the basis of that assessment, they will need to decide whether to build capacity or to outsource to secure the necessary services.

**Module content**
- Overview of water sector functions at town level and allocation principles
- Understanding operational functions
- Understanding corporate oversight functions
- Understanding regulatory functions

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**0.2.1 – WATER SECTOR FUNCTIONS AT TOWN LEVEL AND ALLOCATION PRINCIPLES**

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**What functions need to be carried out for delivering water services at town level?**

To deliver adequate water supply services at town level a number of functions must be performed by various stakeholders at local, regional and national level. These include operations, corporate oversight, regulation, asset ownership, and local-level policy-making:

**Corporate Oversight (Corporate Oversight Body):** Depending on the type of management model that has been established, a corporate oversight body, COB, (e.g. board of directors, Town Water Board) may also be appointed to provide overall direction to the operator, with responsibility for preparing budgets and business plans (with help from the operator), monitoring operational performance, and performing other duties defined in the articles of incorporation and national laws governing corporate enterprises.

**Operations (Operator):** Day to day operations is the responsibility of the in-house operations manager/staff or a contracted operator. Responsibilities include helping the COB to prepare business plans (although approval will lie with the COB, and outcomes will be monitored by both the COB and ROB).

Corporate oversight and operations together make up service provision, or “utility”, and help define the management model.

**Local Regulatory Oversight (Regulatory Oversight Body):** Depending on the level of decentralization, the local authority may carry out some regulatory functions, or appoint an agent to act in that capacity. Local regulatory functions revolve around monitoring operator performance (technical and financial standards) and may extend to the approval of tariffs, fees and business plans, and working with national/state government to ensure that public
health (water quality) and water resources (abstraction) conditions are met, and performing any environmental (discharge) monitoring and enforcement tasks delegated to the town by the national/state government.

**Asset holding** the owner of the assets is responsible for their financing, maintenance and development over time. Ownership is primarily based on political or constitutional considerations and/or sources of financing. Ownership is usually vested in the town or community served by the utility, unless the assets have been privatized (through divestiture) or developed by a private entity; or decentralization has been partially effected and the central government remains the legal owner of the assets.

**Local-level policy making** consists of setting long term sector goals for water services in the town, such as coverage targets or cost-recovery objectives as well as formulating key choices regarding local-level reform or the types of water supply sources, under the overall guidance of national policies or legal frameworks. It is always carried out by the public sector. Regulation ensures that policy choices are implemented in practice and that short-term preoccupations do not over-ride long term policy objectives.

These functions are summarized in Table 0.2.1 below. As the typical allocation of roles and responsibilities in a town reflects local circumstances Table 0.2.1 describes a situation in which the system has been decentralized and a water utility set up at local level to operate the service. Additional details on those functions and the way they are typically carried out are provided in following sub-modules.

**Table 0.2.1 - Town water sector functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Main tasks</th>
<th>Typical allocation in town</th>
</tr>
</thead>
</table>
| Operations        | • Carrying out routine operations  
                   • Help COB with business planning and budgets  
                   • Improving operational efficiency  
                   • Expansion (production/distribution)                                                   | • Town water operating staff  
                   • Private operator  
                   • Specialist service providers                                                           |
| Corporate oversight | • Provide strategic direction for the utility  
                      • Monitor management’s activities (approve budgets and reports)  
                      • Approve business plans and budgets  
                      • Propose tariffs                                                                 | • Corporate oversight body (COB)                                |
| Regulation        | • Approve tariffs for water services  
                   • Monitor service quality and resolve customer complaints  
                   • Monitor environmental impact  
                   • Maintain competitive conditions and regulate other supply modes, such as small scale operators | • Municipal Council  
                   • Or Contract Monitoring Unit  
                   • Can receive support from:  
                     o Above: national regulator  
                     o Below: customer groups                                                           |
| Asset-holding     | • Own existing assets and manage their development  
                   • Service the debt and identify financing (if applicable)                                   | • Municipality  
                   • Or asset-holding company at higher level of Government  
                   • Or higher level of Government                                                            |
### Function | Main tasks | Typical allocation in town
--- | --- | ---
- Plan and carry out long-term investments
- Let contract for services if related to investments | (Ministry)

**Local level**

**Policy making**

- Set coverage and service quality targets for the town as a whole, in accordance with overall town development objectives
- Identify people that may need to receive special subsidies, if applicable | Municipal Council

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**What are key principles for allocating those functions at sector-level?**

Those functions are often carried out by a single entity, for example, a municipal water department. The municipality (different departments) may carry out all five of the above functions simultaneously. This confusion of functions may create conflicts of interest. Typical conflicts of interest include:

- **Between regulation and service provision:** if those two functions are combined and the municipality effectively sets its own tariffs and quality standards, the latter may be tempted to abuse its monopoly position to charge high tariffs or provide sub-quality service.

- **Between policy-making and regulation:** in a politicized context (particularly prior to local elections), local politicians (councillors) may seek to maintain water tariffs at a low level despite previous commitments to set tariffs in order to meet cost-recovery objectives.

To avoid such conflicts of interest, it is recommended that these functions be allocated to different entities so as to establish a system of checks and balances among them. In many countries, water sector reform entails the separation of functions, as shown on Figure 0.2.1 below. Certain functions, such as policy-making or regulation have to remain in public hands because they are usually seen as public sector prerogatives, whereas others, such as service provision, have in some cases been transferred to the private sector. In the water sector, asset-holding has only rarely been transferred to the private sector via sale of assets; delegated management contracts that transfer responsibilities of service provision to an operator are more common.

**Figure 0.2.1 - Separating functions within the water and sanitation sector**

Corporate oversight and operations are synonymous with service provision, or “utility”, and their differences help to define “management models” (see Volume I)
How can these principles be applied at town level?

The principles outlined above are useful when reforming large water utilities. However, applying them to town water supply (especially small towns) may be difficult or even impractical for a number of reasons:

- The town may be too small to have resident WSS professionals. As a result, it may not be possible to have all sector-functions performed by institutions at town level. If separate institutions are set up, human resources may need to be shared by several entities within the town (or between several towns) but this may result in conflicts of interest.

- The separation of functions at town level may be difficult to effect. Some critical tasks, such as tariff setting, may be carried out by the same entity which is in charge of asset-holding and policy setting (typically, the municipality) because there are limited institutional alternatives at town level, or the function is considered as a crucial prerogative of the municipality— that cannot be delegated to another institution.

Rather than focusing on the complete separation of functions at town level, it may be preferable to evaluate whether conflicts of interest have arisen as a result of the existing institutional arrangements and to assess how such conflicts may be prevented in future. This will require a careful evaluation of past activities in order to formulate reform recommendations within the framework of national policies and institutional arrangements. This drives the methodology for carrying out an institutional assessment in Module 1.2.

If it is at all possible, the separation of functions at town level would therefore need to be implemented in a gradual way, in order to increase autonomy for service provision and limit the risk of conflicts of interest. This would typically involve the following:

- If services are provided by the municipality, create separate accounts for the WSS department – once the responsibility for service provision has been decentralized to the municipality, the first step in town water reform is to ring fence the WSS accounts from other municipal finances. This act should ensure that at a minimum revenue generated by the WSS department can cover operating expenses. At a later stage, as a precursor to the establishment of an autonomous utility, the allocation of assets (and corresponding liabilities) should also be attempted.

- Establishing an autonomous water utility at town level - the second step would involve separating the entity in charge of providing water services (the "utility") from other municipal functions. If financial autonomy is granted simultaneously, this would allow town utilities to have their own financial accounts and to track revenues and costs in a more transparent manner, even if subsidies still continue to be received from the local or central government. Allocation of staff to this autonomous entity would also guarantee better and more focused use of resources.

- Establishing a corporate oversight body – the autonomous water utility would require a corporate oversight body (also referred to as a Board of Directors), to supervise the utility and represent the interests of all stakeholders, including consumers. Its composition is critical in order to appropriately balance the interests of various groups and public interest at the local level: it would therefore be advisable to include representatives of customers or of the local business community on that Board.

- Establishing independent regulatory arrangements – regulatory functions, should be carried out independently from service provision or corporate oversight (see 0.4.3 for more details). However, creating an independent regulator at town level may be impractical and some of these functions may therefore need to be carried out by central or regional government agencies— this would guarantee the separation of functions at local level. As regulatory functions that require local supervision are best carried out at
the local level, in some cases, regulation by contract may be more appropriate for towns.

The resulting institutional framework could look as shown on Figure 0.2.2 below, which schematically represents the arrangements in many small towns in Tanzania for example. On that figure, even though town water functions are nominally distinct, the municipality is in charge of policy-making and regulation as well as asset ownership. However, the Corporate Oversight Body (the “Water Board” of the Water Authority) is nominally separate from the municipal council which takes decisions about tariffs and investment plans.

**Figure 0.2.2 – Possible institutional arrangements at town level**

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**0.2.2 - UNDERSTANDING SERVICE PROVISION FUNCTIONS**

**What are service provision functions?**

In order to provide services to its customers, any water utility has to carry out a number of operational tasks, in order to:

- Serve its customers and manage the system on an ongoing basis (routine operations);
- Plan ahead the development and improvement of the system (business planning);
- Carry out operational improvements (operational efficiency);
- Carry out expansion works, for either production or distribution (expansion).
The level of sophistication and the institutional arrangements required to carry out each of these operational functions depends largely on the size of the town (or business unit – if several towns aggregate their service delivery functions) and its human resource and financial capacity. Whereas existing staff at town level, and particularly in smaller towns may be comfortable carrying out routine operations, they may need to receive external support for more specialist tasks, such as business planning or efficiency improvements. The framework for defining whether operational functions are handled in-house or contracted out is discussed in more detail in Module 2.1.

How can service provision functions be carried out at town level?

The size and complexity of a town’s WSS (or group of towns if aggregated) should influence the choice of organizational structure. Larger utilities (serving one or more towns) that have a wider range of more complex functions to carry out internally are often structured in a manner that allows a coherent sets of functions to be grouped within a unit or department. In small towns, where the range of functions performed by the utility operator is likely to be limited to a small but simple set of tasks, a simple organizational structure that groups all functions in one unit (flat structure) may be appropriate.

The “departmental” structure is relevant for large towns, national or regional utilities

Specialist units or “departments” are created around distinct groups of functions, e.g. water and wastewater, customer services, personnel (HR), finance, and capital works (see Figure 0.2.3). Each department is headed by a Department Manager who reports to a Managing Director or Chief Executive Officer— the chief officer may be responsible (if aggregation has taken place) for multiple WSS systems serving several towns. While the departmental structure offers advantages in specialization, economies of scale, and minimal duplication of personnel and technology; one of it’s weaknesses is the difficulty coordinating between units, a problem which increases with size (the organization tends to become too bureaucratic).

Table 0.2.2 shows a detailed set of operational functions for a utility operator with a departmental structure indicating how these functions might be grouped. In practice, this level of detail is too complex for smaller towns. For details of how this structure would work under contractual arrangements (e.g. with a full service operator), the reader is referred to alternative guidelines, such as the World Bank’s Toolkit for Private Participation in Infrastructure (http://rru.worldbank.org/Documents/Toolkits/Water/Water_Full.pdf ).
Figure 0.2.3 Departmental organizational structure

Board of Directors

Managing Director

Corporate functions
- Policy
- Central administration
- Strategic planning

Departmental Managers

Water and wastewater
- Supply
- Distribution
- Collection
- Treatment

Customer services
- Commercial
- Customer

Personnel (HR)
Financial
Capital works
<table>
<thead>
<tr>
<th>Water and wastewater supply, distribution, collection, treatment</th>
<th>Customer services</th>
<th>Personnel (HR)</th>
<th>Financial</th>
<th>Capital works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>Wastewater treatment systems</td>
<td>Meter reading, billings and collections</td>
<td>Payroll operation</td>
<td>Management of (internal) accounts</td>
</tr>
<tr>
<td>Surface water resource systems</td>
<td>Wastewater treatment systems</td>
<td>Stores procurement and stock control</td>
<td>Welfare, safety and discipline</td>
<td>Use of revenue finance</td>
</tr>
<tr>
<td>Groundwater resource systems</td>
<td>Surface water resource systems</td>
<td>Maintenance of current accounts (bookkeeping)</td>
<td>Recruitment</td>
<td>Asset inventory and valuation</td>
</tr>
<tr>
<td>Simple filtration and dosing works</td>
<td>Sludge disposal</td>
<td>Customer information material</td>
<td>Use of contract labour</td>
<td>Corporate accounts</td>
</tr>
<tr>
<td>Simple distribution systems</td>
<td>Emergency planning</td>
<td>Liaison with other stakeholders, e.g. NGOs, Community Associations, etc.</td>
<td>Design of remuneration and benefits structures</td>
<td>Capital accounts</td>
</tr>
<tr>
<td>Public supply points</td>
<td>Maintenance</td>
<td>Management of service contracts</td>
<td>Appraisal systems</td>
<td>External finance</td>
</tr>
<tr>
<td>New customer connections</td>
<td>Mechanical and electrical equipment routine maintenance</td>
<td>Pursuit of bad debts and illegal connections</td>
<td>Incentive systems</td>
<td>Procurement methods</td>
</tr>
<tr>
<td>Buildings, vehicles and plant</td>
<td>Public supply points</td>
<td>Management of service contracts</td>
<td>Training administration</td>
<td>Capital works supervision</td>
</tr>
<tr>
<td>Water and waste quality monitoring</td>
<td>New customer connections</td>
<td>Customer contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment works, storage works and trunk mains maintenance</td>
<td>Equipment servicing and parts replacement</td>
<td>Customer contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment works, storage works and trunk mains maintenance</td>
<td>Water and waste quality monitoring</td>
<td>Customer contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network distribution systems, reservoirs and pumping plants</td>
<td>Treatment works, storage works and trunk mains maintenance</td>
<td>Customer database</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater collection systems</td>
<td>Network distribution systems, reservoirs and pumping plants</td>
<td>Applications for permits and way leaves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term maintenance planning</td>
<td>Wastewater collection systems</td>
<td>Capital and supply contract design</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Financing agreements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adherence to Sector, commercial, consumer and employment law</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A simple utility operator structure is more relevant for small towns

For many towns, particularly small towns, the “departmental” organisational structure is too complex for the basic functions that are required, particularly if the management of Town WSS is handled independently (see Module 2, step 2.1). In these towns, a “simplified” organisational structure that is designed around four sets of core functions: routine operations, business planning, operational efficiency, and expansion; is more appropriate. The operational functions in each of these core areas are show in Table 0.2.3 below:

Table 0.2.3 - Four core functional areas for small town utilities

<table>
<thead>
<tr>
<th>1. ROUTINE OPERATIONS**</th>
<th>** Routine O &amp; M includes: valve inspection and exercising, water main cleaning and flushing, pipe location and leak detection, emergency repairs and other minor works, meter maintenance, O &amp; M of storage facilities, O &amp; M of pumps, record keeping for pipe network maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Meter reading</td>
<td></td>
</tr>
<tr>
<td>• Billing and collection</td>
<td></td>
</tr>
<tr>
<td>• Accounting</td>
<td></td>
</tr>
<tr>
<td>• Routine O&amp;M **</td>
<td></td>
</tr>
<tr>
<td>• Monitoring</td>
<td></td>
</tr>
<tr>
<td>o Production</td>
<td></td>
</tr>
<tr>
<td>o Water quality</td>
<td></td>
</tr>
<tr>
<td>o Customer satisfaction</td>
<td></td>
</tr>
<tr>
<td>• House connections</td>
<td></td>
</tr>
<tr>
<td>• Stores</td>
<td></td>
</tr>
<tr>
<td>2. BUSINESS PLANNING</td>
<td></td>
</tr>
<tr>
<td>• Customer demand assessments</td>
<td></td>
</tr>
<tr>
<td>• Investment planning, including expansion planning</td>
<td></td>
</tr>
<tr>
<td>• Securing professional support</td>
<td></td>
</tr>
<tr>
<td>• Financial modelling</td>
<td></td>
</tr>
<tr>
<td>• Tariff setting</td>
<td></td>
</tr>
<tr>
<td>• Funding applications and borrowing</td>
<td></td>
</tr>
<tr>
<td>• M &amp; E, including external audit</td>
<td></td>
</tr>
<tr>
<td>3. OPERATIONAL EFFICIENCY</td>
<td></td>
</tr>
<tr>
<td>• Technical training</td>
<td></td>
</tr>
<tr>
<td>• Financial management training</td>
<td></td>
</tr>
<tr>
<td>• Problem solving, e.g. pump maintenance</td>
<td></td>
</tr>
<tr>
<td>• Collection performance</td>
<td></td>
</tr>
<tr>
<td>• Unaccounted-for-water reduction</td>
<td></td>
</tr>
<tr>
<td>• Power and chemical usage</td>
<td></td>
</tr>
<tr>
<td>• Procurement services (goods/chemicals)</td>
<td></td>
</tr>
<tr>
<td>• Improved monitoring</td>
<td></td>
</tr>
<tr>
<td>• Performance indicator analysis</td>
<td></td>
</tr>
</tbody>
</table>
| 4 EXPANSION (DISTRIBUTION / PRODUCTION) | Includes planning, financing, procurement, execution or supervision of expansions:  
  
• Engineering design  
• Contract management  
  o Bid document preparation and evaluation  
  o Construction supervision  
  o Commissioning and hand over |
As these operations can typically be handled by a system manager, with one or two technical/financial professional staff, and a handful of operational workers (see Figure 0.2.4. below), the organisational structure of the utility operator can remain relatively flat. It should be noted that because of their small size and flat structure, small utilities tend to have more ambiguous roles and responsibilities (e.g. communication being channelled through informal/less bureaucratic channels). When things are going well, this is a strength since the flexibility it provides allows for a faster response time, and this may improve accountability. However, when things are not going so well, this ambiguity may lead to a breakdown in the functioning of the utility operator.

As authority tends to rest with a single person, i.e. a system manager who reports to an oversight body, or an owner/manager, the success or failure of the utility rests largely in the hands of this individual. Generally, as the utility begins to grow, there comes a need to formalize roles and responsibilities, the process of developing strategy, and the systems of communication. In addition, given limited in house capacity, it may be necessary for the utility to secure either in-house capacity or to outsource functions relating to business planning, efficiency improvements, and expansion. Due to limited capacity and resource limitations this is often not done in a timely and systematic manner.

**Figure 0.2.4: Simple Organizational Structure**

![Simple Organizational Structure Diagram](image)

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### 0.2.3 UNDERSTANDING CORPORATE OVERSIGHT FUNCTIONS

**What is corporate oversight?**

Corporate oversight is an integral part of a WSS utility. The role of the Corporate Oversight Body (COB) is to guide the utility’s strategy, appoint, supervise and remunerate managers and staff, and make decisions about whether and how to build capacity or to outsource. In doing so, the COB also is also involved in approving budgets and preparing the “business plan”, (see Module 1.6 and Step 2).

Corporate oversight is often closely associated with share ownership, which can be derived from asset ownership. In mainstream limited liability corporations, the purpose of a corporate oversight body (known as the Board of Directors) is usually to govern a corporation on behalf of the community of shareholders. Shareholders usually provide their views on the performance of the Board of Directors once a year, at the General Assembly of shareholders.

At town level, corporate oversight may be vested in a Water User Association, Town Water Board or a utility Board of Directors. The members of the COB¹ are typically part time

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¹ The generic term corporate oversight body, COB, is used here, because different terms tend to be mean different things in different countries (for example, the term Water Board is widely understood as an autonomous stakeholder model in much of Africa, but means a state institutional model in much of South Asia).
volunteers, or may receive some nominal reimbursement for attending meetings. The generic term corporate oversight body, COB, is used here, because different terms tend to be mean different things in different countries (for example, the term Water Board is widely understood as an autonomous stakeholder model in much of Africa, but means a state institutional model in much of South Asia).

In general, the COB would be accountable to the asset owners and government authorities. However different management models influence the COB’s line of accountability: for example, a town Water Board would be accountable to all stakeholders within the town; while a Water Association would only be accountable to its members.

**What are the oversight functions?**

Corporate oversight at town level would typically consist of the following:

- **Drafting their own statutes or bye-laws and setting out rules for internal COB management and decision-making** (such as voting rules and appointments within the COB) and recruitment of COB members.

- **Appointing the water utility's management staff and holding them to account.** The COB would typically nominate or appoint the water utility's operations manager and hold him or her accountable for their actions, acting *de facto*, as the boss of the water utility operations manager. The water utility operations manager should have broad powers to manage the corporation on a daily basis, but he or she would need to get board approval for certain major actions, such as hiring his/her subordinates, raising money or making significant investments.

- **Approving and monitoring the water utility's strategy, as embodied in a Business Plan.** The COB should be responsible for defining the water utility’s long-term strategy, based on the policies set at national and local level (with respect to coverage expansion, for example) and the framework set by the regulatory body (with respect to tariff increases, for example). The corporate oversight body is therefore responsible for directing the business planning process. Although the actual process may be carried out by consultants or an operator, the COB would ultimately need to approve the business plan. The Towns advisors would need to work closely on this with the town utility operations staff, who would be responsible for performing the technical work or assisting the consultant in this task. Once the Business Plan has been prepared, the COB should ensure that the water utility management team is effectively working towards achieving the goals set out in the Business Plan and has the financial and technical means to do so. This can be done by reviewing and questioning management reports on a regular basis. Business plans may still need approval from the regulatory oversight body (ROB) or owner depending on the institutional arrangements on the ground.

- **Approving the water utility's annual budget and endorsing applications for tariff revisions.** A key component driving the water utility’s ability to meet its goals as stated in its Business Plan is its annual budget. The COB will be in charge of approving the budget and supporting the tariff applications to the ROB, as prepared by the water utility’s operations manager.

- **Monitoring the utility's performance.** The ability of the COB to monitor the utility’s performance depends on access to information, and in particular, financial information. This can be aided by an external auditing process, although the auditors would require independence in order to make a positive contribution. Typically the auditors would be contracted by the regulatory oversight body (ROB) or owner of the assets, but the information made available would benefit all parties. (see Module 3.3 for more on monitoring and evaluation).
Resolving any internal dispute as they emerge, for example, if a dispute emerges between the manager and one of its employees over salaries or working conditions.

The COB is ultimately accountable for the utility’s actions since the operator would have taken decisions under its authority. This may be particularly significant if any dispute arise between the water utility and other parties (such as with the local regulatory body on the setting of tariffs or enforcement of quality standards). In such case, the COB would need to uphold the interests of the water utility whilst it is seeking to address the roots of the problem (if any) within the utility in a dialogue with its operations management.

When a contract with a private operator is let for the management or operations of the utility, the COB is responsible for tendering and supervising the contract and ensuring that the private operator is meeting the terms of its contract. When such contract with a private operator has been signed, it is important to address any capacity limitations within the COB in order to balance the capability of the private operator.

Regular COB meetings should allow potential problems to be identified, discussed and avoided. Depending on the size of the utility, such COB meetings may need to take place every month or up to every 3 months. Any of the COB members should also have the ability to convene a COB meeting when a problem has emerged.

How can corporate oversight be carried out at town level?

Depending on the country and nature of the utility, the COB may be established under a variety of different legal statutes. For example, the asset-holder, e.g. the Municipality, may pass a “bye-law” requiring the establishment of a COB, in which it vests ownership and oversight responsibilities. Some of the key characteristics of the COB are discussed below:

Composition of the COB

The COB should typically represent all key stakeholders (such as different consumer groups, business associations, local professionals and respected leaders within the community) in order to increase its legitimacy. The COB may represent more than one town when aggregation has taken place (see step 2.1, Module 2). In the event that parties other than the municipality (such as the central or state government, local private businesses, or even a contracted private operator) own shares in the utility the representation of shareholders on the COB would also be important. (Further information on alternative management models, such as Government PLC and mixed ownership models, is provided in the TWSSI Phase One report).

The COB needs a range of skills and understanding to be able to review and challenge management performance. It would be important to ensure that COB members have some qualifications – otherwise there would be an imbalance in water service management knowledge between the Board and the water utility operator. While not essential, the involvement of knowledgeable (local sector experts) can enhance the COB’s competence.

While the COB should be of sufficient size and and wield sufficient authority to fulfil its duties it should not become unwieldy. The exact number of Board members would depend on the town’s size and/or the number of shareholders and stakeholders to be represented. National policies and legislation can provide a framework for the establishment of the COB at the level of town utilities, which could include specifying a typical COB composition and decision-making rules (see the example of Tanzania below).

Box 0.2.1 - Proposed Water Board composition in towns in Tanzania

1) Representatives of the Local and Regional Administration:
   • The Regional Water Engineer (as a representative of Central Government)
• The District Executive Director (DED), as head of the local administration
• The District Water Engineer (DWE), or similar, who may be hired by the District if the District can freely manage its own personnel

2) Representatives of the Users (elected at the most appropriate level):
• A representative of commercial or private users
• A representative of "domestic" consumers (preferably a woman)
These two representatives would be residents of the town.

3) Representatives of the District Council:
The District Council would appoint two District Councillors. At least one would be a woman. At least one would be resident of the town.

In the absence of such provisions at national level, the local government should seek to establish a representative COB when forming the town water utility (e.g. following a corporatization process). In doing so. The town should seek to follow the principles highlighted above.

0.2.4 UNDERSTANDING REGULATORY FUNCTIONS

What is regulation?
Regulation of water services is required to ensure that tariffs are set at the right level (neither too high nor too low) and that quality standards (including environmental, customer service and drinking water standards) are complied with. But regulation does not stop at enforcing existing rules or contracts: it may also involve modifying those rules (or contract) overtime in order to cope with unforeseen events. The objective of regulation is that those services be provided in an efficient, fair and sustainable manner, whilst bearing in mind social priorities set out by the Government at national and local level. As water services are an important component of local life, politicians will often try to use arguments about those services in their election campaigns. This may not always be based on an honest assessment of the services and it is therefore important that somebody (such as a regulator) may be able to intervene so as to set a longer term course for the provision of water services.

The main objective of regulation can be broken down in three elements:
• To protect customers from service providers’ abuse of their monopoly power and from political interference;
• To protect service providers from politically-driven decisions and keep political interference under check;
• To enable the public sector to carry out its long-term policy objectives, such as expanding services to people currently without access.

The role of the entity in charge of regulation at town level (which we refer to as the “Regulatory Oversight Body” or ROB) is therefore to arbitrate the various interests of customers, politicians and service providers. This is a tough position to hold consistently particularly when capacity for regulation is limited (as it would typically be at town level) and when it is difficult to separate between the political and regulatory functions, which is particularly true at town level where the same persons may end up wearing both hats.

What are typical regulatory functions in the water sector?
Regulatory functions in the water and sanitation sectors can be broadly divided into three categories: economic, environmental and public health.
Economic regulation consists of setting, monitoring and enforcing tariffs and service standards for water service providers. Economic regulation can be broken down further into four functions: price regulation, service quality regulation, competition regulation and consumer protection:

- **Price regulation** consists of setting overall tariff levels and tariff structures so as to ensure delivery of services at an affordable cost while ensuring the long-term financial viability of the sector.

- **Service quality regulation** entails defining levels of service on product characteristics such as technical requirements or customer responsiveness.

- **Competition regulation** consists of monitoring that there is effective competition when a contract is let and of ensuring that, when there are several forms of supplies in a town (such as water tankers, standpipes, network supply, etc…) they can compete effectively and constructively.

- **Consumer protection** entails resolving consumer complaints in second instance (after they have been dealt with by service providers).

The national legal framework would usually determine how these functions are to be conducted. This would greatly depend on the level of decentralization of service provision and regulatory functions. In some countries, even though service provision is decentralized, a national regulatory body has been established which is in charge of setting tariffs and regulating quality for all municipal services. The main purpose of such model is to reduce the risk of political interference at the local level for tariff setting. However, this model is often difficult to introduce or to render effective in practice, because of the magnitude of the task (a large territory to cover, high number of towns, etc…) or due to political resistance at the local level. A more common model when service provision is decentralized is therefore to have economic regulation functions carried out at town level by the municipal council or a specially set-up contract monitoring unit within the municipal council. They would do so on the basis of national guidance and any existing regulatory framework at town level, such as the contract with an operator. This could involve reviewing and approving business plans submitted by the operator, monitoring their implementation as well as revising business plans and related contracts.

Environmental regulation consists of regulating water abstractions and discharges back to the environment so as to manage resources in a sustainable manner. The bulk of environmental rules, such as abstraction and discharge standards and any penalty system that may be in place, is usually defined at the national level and enforced by the Ministry in charge of the Environment. Based on such rules, a regional administration (such as a River Basin organisation) or in some cases, the municipal council itself could be involved in keeping a registry of abstraction points or even issuing a licence for abstractions and levying a small charge on the use of such a water point. Before granting such a licence, it would be necessary to assess the potential impact of the planned abstraction on existing users and on the availability of water resources in the town. Such activities could also involve regulating discharges into the environment, focusing initially on large users.

Public health regulation would usually focus on drinking water quality regulation, which is a key determinant of the quality and therefore, of the price of water services. Once drinking water standards have been set (usually at national level, typically by the Ministry of Health), monitoring must take place at the local level to ensure that such standards are met. The municipal council would need to carry out regular testing of water quality, both at source and at various delivery points. Support for such monitoring activities may be provided at the national level, especially for carrying out more sophisticated and expensive testing.

How can economic regulation be performed at town level?

Regulation at town level is often carried out by the municipal or the district council, which typically owns the facilities. This is not ideal, because it introduces the risk of politically motivated decisions, particularly during elections, but it may be difficult to avoid because of
limited institutional capital and human resources at town level. If a contract with an operator is in place, the potential for the municipality to make arbitrary decisions is more limited. Examples of how this may work in practice for various regulatory functions are provided below.

At town level, the municipality (which is also the owner of the assets) would typically be in charge of setting tariffs. This can be done in several ways:

- **The local government** (municipal council or mayor) may be in charge of setting the tariff based on tariff-setting principles and procedures defined at the national level (by law, or by a resolution of the national regulator). A national framework for tariff-setting can help introducing sound tariff principles, especially if local governments have an incentive to adopt such principles. Incentives can be introduced by linking central government financial transfers to the adoption of tariffs based on such principles. The operator may also be able to appeal tariff decisions taken at the local level to a regional or national body, if it deems that the tariffs imposed at the municipal level have not been defined on the basis of such principles.

- The bulk of the regulatory regime (such as tariff path, service standards, etc) can be defined in a contract between the owner of the assets (typically, the local government as well) and the operator. Other operators (whose assets are not owned by the municipality but tend to be privately owned) may be regulated through simple licenses or authorizations. If a contract is signed, particularly with a private operator, it can be monitored either by the municipal council itself or by a local-level contract monitoring unit (CMU), which can be housed in the municipal council but function in an independent manner. This would only be applicable for towns with sufficient resources to finance such a unit (note that such unit could be grouped to monitor various infrastructure services that have been delegated). A CMU may have many of the attributes of a regulatory agency (including competence and autonomy) and would be in charge of monitoring performance but would typically have less discretion for modifying the rules in the case of unforeseen events or substantial change in circumstances than a regulatory agency with a high level of discretion would have.

None of these institutional mechanisms are perfect because it is often difficult to isolate the local-level regulatory mechanism from political intervention and to maintain autonomy. Regulatory competence at the local level may also be limited, given that the same persons may end up being involved in several capacities. However, all of these mechanisms can be strengthened through:

- **Systematic Monitoring and Evaluation.** Modules 3.1 and 3.3 show how the contract and monitoring and evaluation framework can be linked to the process of business planning. In this way, development of the capacity to monitor / regulate is planned for as part of the business planning process.

- **Stakeholder groups** to represent customers and give feedback to the local level regulator on the service quality experienced by customers and increase the legitimacy of the regulatory process. For example, the regular use of community scorecards through focus groups is one such method.

- **National level** regulatory support for the local level regulator. By defining an overall framework for regulation (including principles for tariff setting or determining quality standards for example), carrying out benchmarking of performance in towns throughout the country or providing technical assistance for specific regulatory tasks (such as tariff reviews) the national regulator can extend support to municipal councils or local level contract monitoring units. Such support may be provided through a variety of different institutions such as associations of municipalities or technical assistance agencies.

The institutional analysis at town level will need to identify which institution is currently in charge of carrying out the various regulatory functions, whether they are adequately performed and whether the relevant institution has the necessary attributes to carry out these functions adequately— including competence, autonomy and legitimacy. If some of these attributes appear to be lacking, the sources of support mentioned above could be introduced.
In practice, what does town level economic regulation entail?

Regulation of service providers is particularly important in order to ensure that water tariffs are set at the right level, i.e. that they are neither too low (not sufficient to cover operating costs and maintenance costs) nor too high (including a high margin):

- **Tariffs may be too low** if local politicians have traditionally subsidized water in order to get political support or if the system is oversized compared to the population’s needs and ability to pay. Rather than the problem being that consumers are unwilling-to-pay, many people have pointed to politicians as being “unwilling-to-charge” as a main reason for low and unsustainable tariffs. If tariff-setting principles are defined by law at the national level (see Box 0.2.2), the role of the local ROB would be to apply those principles at town level. A gradual tariff increases to reach a tariff level that covers service costs in a sustainable way and that customers can afford should be introduced in such case.

- **Tariffs may be too high** if service providers can charge whatever they want because consumers cannot choose between competing suppliers and they value access to water services greatly because they do not have any alternative or if the system is overdesigned and the customer base is inadequate. Even government-owned providers may take advantage of consumers by charging too much, because they make no effort to improve productivity, they artificially increase investment costs due to corruption or water tariffs are used to subsidize other services in the municipalities. The institution in charge of economic regulation (typically the municipality) may then need to assess what efficient costs and a fair rate of return on investments would be, to define maximum tariff levels.

**Box 0.2.2 – Common tariff-setting principles**

Most water service legislation would specify tariff-setting principles which are more or less binding when setting tariffs at the local (or national) level. Such tariff-setting principles usually focus on three characteristics:

- **Cost-recovery**: tariffs should be sufficient to cover the costs of providing the service. Various definitions may be used, depending on how far the existing tariffs are from cost-recovery levels and how challenging moving to cost-recovery levels may be in the short term. Most legislation would require that tariffs cover at least operations and maintenance costs, plus replacement of short life assets. Better utilities may be required to cover the costs or depreciation, and major investments (i.e. providing a fair return on capital) if there is a real attempt to move to sustainable services. In all cases, it can be useful to specify a transition path towards cost-recovering tariffs (including investment) so as to set clear targets for the utility’s management. An incentive to better utilities to take on increasing levels of cost recovery can be increasing autonomy, e.g. to set staff salaries, as this was done successfully in Tanzania.

- **Economic efficiency**: in particular, allocative efficiency which refers to whether consumers are purchasing the optimal quantity of a product relative to its economic and social cost of production. For water services, the main preoccupation is that volumetric tariffs reflect the marginal cost of producing water (i.e. the cost of the last unit to be produced and consumed). This is particularly important in water-scarce environment where such marginal cost can be very high when a lot of water coming from comparatively cheaper sources has already been used.

- **Equity**: water (and sanitation) is often considered to be a social good, which means that it should be available to all at a price they can afford. Therefore, it is generally considered fair or equitable to apply a lower charge or lifeline tariff to a so called “first block” (between 5 and 15 m$^3$ per month per connection, depending on the country). However, the definition of “equity” is likely to vary substantially from one country to the next depending on what is politically understood as equitable. Many consumers may not have access to such a lifeline tariff because they are not connected.
Such analysis is not easy to undertake and the local regulator may need to access professional support to that effect, from a national regulator, universities or external consultants. This would not only improve its competence but also autonomy and legitimacy.

**What are typical regulatory tools and instruments that can be used at the local level?**

The ability of a municipal council to conduct regulation is often going to be limited. Therefore, it is important to carefully select regulatory tools and instruments that are easy and relatively cheap to use, with maximum efficiency. These instruments may include reliance on consumer complaints to identify problems with the service (rather than provide data for monitoring service quality); the publication of information on performance; or penalties applied on the basis of the contract. If regulatory capacity is low, it may be preferable to use regulatory instruments that rely quite heavily on information diffusion and consumer feedback and minimise the need for ongoing monitoring activities or the application of penalties for infringement of standards.

Whatever regulatory tool is used, access to information will be crucial, including access to:

- **Financial information**, to set tariffs that allow the service providers to finance their functions (including expansion) but stop them from making extraordinary profits;

- **Technical information**, in order to monitor service providers’ performance (such as the rate of unaccounted-for-water or the time spent to mend a broken pipe or repair a pump);

- **Customer service information**, to assess whether customers are getting value for their money (such as the time required to obtain a new connection following a request or the accuracy of the billing system) – this is where forming customer associations which can act as relays for this information can help, although an independent assessment would always be required to avoid manipulation;

- **Information on compliance** with environmental and drinking water standards, to assess whether standards are effectively met. This may be relatively straightforward with official operators but more difficult with informal ones. Methods for conducting basic water quality testing for small-scale providers should be investigated, especially when they cover a large proportion of local consumers’ needs.

(☞ see Module 3.3 for additional information on the monitoring and evaluation framework for Town WS)
Module content

- Routine operations activities
- Business planning activities – strategic decisions
- Principles for conducting operational efficiency activities
- Cost effective design for service improvement and expansion

0.3.1 – Routine Operations Activities

Routine operations are defined here as the tasks that a local operator with basic training is capable of handling. Such tasks are routine in the sense of being carried out on a regular basis, and in the sense of being straightforward. Routine tasks are distinguished from specialist services which require a higher level of professional experience and skill, and which tend to be periodic.

The routine activities required to operate and maintain a water supply system include the following:

- **Meter reading** (where meters are provided)
- **Billing and collection**
- **Accounting**
- **Routine operational and maintenance**
- **Monitoring production, water quality and customer satisfaction**
- **House connections**
- **Stores**

The personnel required to carry out these tasks may be employed directly by the Corporate Oversight Body, COB, by an operator contracted by the COB, or by specialist services providers. The important strategic decisions relate to the mix between these options.

Larger utilities may employ specialist staff, e.g. a person with direct responsibility for responding to customer complaints. For smaller utilities, these roles will normally be fulfilled by one of the management team or staff with broader job specifications.

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2 Routine O & M includes: valve inspection and exercising, water main cleaning and flushing, pipe location and leak detection, emergency repairs and other minor works, meter maintenance, O & M of storage facilities, O & M of pumps, record keeping for pipe network maintenance.
The core theme of the main Guidance Manual deals with the business planning process, and step 2 materials with preparation of the business plan, and this is not discussed in detail here. It is noted, however, that in general, strategic decision-making will be the responsibility either of the corporate oversight body together with the operations manager of the town utility, or the contracted operator. Decisions may be based on information obtained by consultants but ultimate responsibility for making decisions should normally rest with the corporate oversight body or the operations manager of the utility.

Execution of routine operational tasks is absolutely essential to the effective and efficient operation of the water supply system. However, operational effectiveness and efficiency can only be sustained in the long-term if managers take the right strategic decisions. These decisions (business planning activities) relate to: customer demand assessments, investment planning, securing professional support, financial modelling, tariff setting, funding applications and borrowing, and monitoring and evaluation. These activities are discussed in detail in different modules, in particular Modules 1.3 to 1.6, and Modules 2.1 and 2.2).

Three key strategic decisions directly relating to operational activities are:

- The types of facilities provided;
- The human resources required to ensure the sound operation and long-term viability of the system;
- The balance between maintaining good services to existing customers and extending services to new customers;

**Types of facilities provided** - The choice between different types of facility will obviously be influenced by their capital and running costs. Another important point to consider when deciding what type of facility is to be provided is whether or not it can be easily maintained with resources that are likely to be available. The importance of matching design with financial viability and customer willingness and ability to pay is emphasised throughout the business planning process.

**Human resource requirements** - Strategic decisions with regard to human resource requirements will mainly be about whether to bring in new people, whether as employees or contractors, in response to changing circumstances and new needs. When considering human resource requirements, start with the ‘strategic’ management posts, without which it will be difficult to ensure that effective systems are sustained. Is there currently an overall operations manager and a finance manager? If not, is there a need to create such posts and/or recruit people to fill them? After this, consider the human resource requirements relating to routine activities.

Where adequately trained staff are not available, it will be necessary to develop a human resource development strategy. This might involve training but could also involve bringing in needed skills from the private sector. Training and capacity development should not be seen as an afterthought to the strategic plan but rather as an integral part of the plan.
Service improvements versus service extension - Strategic planners need to take account of the costs and likely benefits of investments. One particular aspect of this is the assessment of the balance to be struck between improving services to existing customers and extending services to new customers. In general, where existing services are poor, the initial focus should be on improving these services. Where existing services are adequate, the strategy may include efforts to both increase the number of connections in the existing supply area and extend services into new areas. Whenever considering system extensions, it will be necessary to consider the investments required at all points in the system hierarchy to support them. It will also be necessary to ensure that there is demand for services in the targeted areas. These points are brought together in a decision tree in Figure 0.3.1 below.

Figure 0.3.1 Deciding on the priority to be given to system extensions

0.3.3 – PRINCIPLES FOR CONDUCTING OPERATIONAL EFFICIENCY ACTIVITIES

What is operational efficiency?

Engineers define operational efficiency as the output produced from an asset (normally a piece of plant or equipment) divided by the output that would have been produced from the asset over the same period if it had been operating at its optimum or rated capacity. In relation to the system as a whole, operational efficiency can be defined in terms of the need to minimise the expenditure required to ensure that citizens receive acceptable quality water at an affordable price in sufficient quantity to meet demand. Water supply managers need to be concerned with both the operational efficiency of individual system components and the way in which the performances of these components combine to define the operational efficiency of the water supply system as a whole.

The importance of having a focus on operational efficiency cannot be overstated. For example, in many small town situations there is pressure on engineers to augment source works to
increase production capacity and put more water in the system. In fact, it may be that there is already sufficient production capacity, but that unaccounted for water is very high, or some other malfunction within the pipe network is creating a loss of pressure. A focus on efficiency can therefore often help reduce investment costs, and improve financial viability as well as service quality.

**How can operational efficiency be measured?**

While it should be possible to directly measure the operational efficiency of individual components such as pumps, it will normally be necessary to assess the operational efficiency of the system as a whole through a series of performance indicators. Indicators that relate directly to financial and technical operational efficiency include, for example:

- Operating expenses / m3 into supply;
- Unit energy use (energy expenses / m3 into supply);
- Unaccounted for water.

Most importantly these indicators should be monitored in terms of their trend, i.e. improvement over time.

Indicators that relate to the outcomes (impact on consumers) achieved through improved operational efficiency include, for example:

- Duration of supply: number of hours per day for which water is supplied;
- Pressures at specified points in the system;
- Number of unscheduled interruptions in supply lasting an hour or more.

(A complete list of key indicators is provided in Module 3.3)

**Options for improving operational efficiency**

Some basic principles for improving operational efficiency are briefly discussed below:

- **Ensure timely repair and maintenance of system components;**
- **Improve collection performance:** ensure that all water users are billed and that bills are paid promptly. This is important because income depends on bills being issued and paid while good operation and maintenance are dependent on the water utility having sound finances;
- **Maximise use of least-cost resources.** This is relevant where a system is supplied from more than one source. If there is a choice, the aim should always be to maximise the use of water from the lower cost resource or resources. (See example below).
Box 0.3.1. Maximising the use of least cost resources – an example from India

The town of Tirupati in Andhra Pradesh receives water from two sources. The older source is a reservoir located in the hills above the town, from which water gravitates to the town. This has insufficient capacity to serve the town as a whole and has been supplemented by water drawn from a canal some 40km away. From the intake point, water is pumped up to a holding reservoir from which it is pumped via a number of intermediate pumping stations to the town. The production cost of water from the original reservoir is clearly much less than that from the new source. At present, each source serves a particular zone within the town. Use of the original source is limited by the fact that a minimum volume of water has to be left in the reservoir at all times and inflow to the reservoir is dependent on rainfall and so varies from year to year. Nevertheless, given the low cost of reservoir water, a sound operational strategy should aim to maximise the use of this source. This may require some expenditure to reconfigure the water distribution system to allow some areas to be supplied from either of the two sources. The strategy will also benefit from action to minimise leakage along the transmission main linking the reservoir to the town.

- **Reduce wastage:** including unaccounted for water and power and chemical usage. This applies not just to wastage of water in the form of leakage but also to other forms of wastage. It might be, for instance, that reorganisation of the arrangements for preparing and issuing water bills could enable the time of those charged with the task to be used more efficiently. Better management of water treatment facilities might enable filter runs to be increased and so reduce the amount of water used for backwashing. Inefficient chlorination methods not only waste chlorine but may also lead to deterioration and premature failure of clearwater and reservoir tank roofs because of corrosion caused by excess free chlorine;

- **Focus on problem solving:** identify ‘weak’ points in the system and take remedial action. An example of a weak point would be a water main or pump that fails regularly and so compromises the overall performance of the system;

- **Effective procurement services for goods and chemicals.** Reliable and cost effective sources should be established to keep costs of goods and services to a minimum;

- **Secure necessary technical and financial management training.** This is often overlooked as an expense that can be foregone. But ongoing training is critical so that professional and operating staff can deal with the challenges of improving operational efficiency.

- **Improve monitoring (production, water quality, customer satisfaction), and performance indicator analysis.** The collection of information and analysis of performance indicators will help to show the effects that other activities are having on overall operational performance. This in itself is an important motivator for improving efficiency.

**The importance of information and the need for appropriate instrumentation**

One point that is common to all these options for improving operational efficiency is their dependence on information. Without information, it is impossible to make sound operational decisions. So, any strategy for improving operational efficiency must take account of the need to gather relevant information and then use that information effectively. This, in turn, means that the strategy must ensure that appropriate instrumentation is in place, that instruments and meters are read and that appropriate operational decisions are made on the basis of those readings. At the very least, the following instruments and meters should always be installed and operational:

- Bulk flow meters on all production facilities, on transmission mains and at the points where water is delivered to individual supply zones

- Ammeters, voltmeters and pressure gauges on all pumps.

- Head loss gauges on filter beds.

- Level gauges on all service reservoirs.
These should be regularly read and operators should be trained in basic analysis and use of the data obtained from these instruments. For instance:

- Bulk flow meters can be used, with information on the number of connections in specific supply zones, to analyse where water is being used within the system. More immediately, comparison of flows day on day will reveal any significant increase in flow, which might be indicative of a major leak in the system.

- Ammeter and voltmeter readings indicate that a pump-set is operating within its intended range. Changes may indicate a need to investigate the need for repairs and/or maintenance.

- Head-loss gauges on rapid gravity filter beds should be used to indicate when the filter needs to be backwashed. If the head loss remains high despite frequent backwashing, it is probable that the filter sand needs to be replaced.

- Level gauges on service reservoirs provide a simple way of assessing when the reservoir is full and are thus useful for routine operational purposes.

### 0.3.4 – Cost Effective Design for Service Improvement and Expansion

Having considered routine operations, business planning and operational efficiency, the last key functional area to consider is expansion. The key principle is the need for cost effective design.

**Why design needs to be cost effective**

Developing countries in general and small towns in particular have limited financial resources. It is therefore important that the resources that are available are used as effectively as possible. One particular aspect of this need is that designs should be cost effective. In other words, they should achieve desired objectives at lowest cost that is compatible with the achievement of those objectives.

**Box 0.3.2: Key principles of cost effective design**

In Volume I, Chapter 3, the following key principles are identified:

- Water supply and sanitation services need to be sustainable in both short and long term. Towns should therefore plan for the current population, but should also plan to expand the system gradually based on actual demand. Key elements of a design strategy are:
  - Design of service level based on customers' willingness / ability to pay;
  - Phased expansion and sequential upgrades corresponding to demand;
  - Connection policies designed to increase the number of household connections;
  - Government promotion of affordable design – regulations and design standards, and guidelines for design, connection policy and stakeholder consultation; and
  - Systems and technologies appropriate to local capacity and culture.

- Design of facilities and cost-recovery measures should be developed in consultation with present and prospective users of water supply and sanitation services.

In particular, there is a need to realistically evaluate income (demand) against the costs of particular technologies / investments, and to take account of the uncertainty of growth in individual towns. The emphasis should therefore be on assessing the current demand and use of shorter planning horizons (around 5 years), with modular designs to accommodate future
expansion and sequential improvements over time. The connection policy should include options for both individual and shared connections, as well as kiosks and stand pipes. Box 0.3.2 provides some key principles identified in the Volume I report, and the reader is referred to Volume I, Chapter 3, for further information.

**Cost effective design and overall objectives**

The overall objective of any water supply operation is to provide a satisfactory service to customers. So, cost effective design must take account of the likely impact of new facilities on the service provided to current and potential future customers. This raises the questions of who are the customers and what strategy should be taken to improving the service provided to them.

Existing customers clearly must live within the area covered by the existing water distribution system. Potential future customers fall into two broad categories:

- Those that live within the area covered by the existing distribution system, who could therefore connect if they so wished.
- Those who can only be served if the distribution system is extended.

The objective of water supply improvements may be to:

1. Improve levels of service in areas served by the existing piped water supply system.
2. Extend the system to allow new connections in currently unserved areas.
3. A combination of the two

Where service levels in currently supplied areas are already good, the possibility of extending the system to increase the service area should be considered immediately.

Where existing service levels are poor, improvements in the level of service in existing supply areas may be a necessary precondition for existing customers to pay the higher tariffs that are required if the water supply operation is to be financially viable. They may also encourage those who have not previously taken connections to connect to the system. Once service levels have improved, it should be possible to move on to consider the options for extending services to new areas.

Whatever the short-term strategy, the long-term aim should be to ensure that everyone in the town has access to safe water in sufficient quantity to allow good hygiene. This does not mean that everyone in the town has to have access to the piped water supply. For instance, households that have access to reasonable quality shallow groundwater may choose not to connect, but can be offered a shared connection, kiosk or stand pipes as an improved service. In some areas, collection of rainwater from roofs may be an alternative supply option. However, designers should bear in mind that a well operated piped water supply system can often provide water more cheaply than other options.

**Basic principles of cost effective design**

In addition to the key principles highlighted in Box 0.3.2, other basic principles for cost-effective design include.

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3 ‘Sufficient quantity’ might mean 20 litres per person per day in areas without water-borne sanitation and 30 litres per person per day in areas with water-borne sanitation although there are likely to be some regional differences in what is considered acceptable.
1. **Take account of existing facilities.** Few towns will be without an existing water supply scheme, even if in some cases it is currently non-operational. Wherever existing facilities are in good condition, the aim should be to supplement rather than replace them.

2. **Understand the system and its components** Water supply systems consist of a number of basic components, arranged in a hierarchical system. When considering the options for improving/ extending services, it will be important to understand the roles of the different components, the way in which they are linked and the location of problems and bottlenecks within the system. For instance, low pressure at a consumer’s tap might be caused by a long small diameter house connection, inadequate distribution mains, inadequate pressure from pumps or an elevated storage tank or a general shortfall in supply in relation to demand. The key to making cost-effective improvements is identifying the cause or causes of low pressure and taking action to deal with them.

   Understanding the system, its components and the possible sources of contamination is also important when considering the options for improving water quality. Where contaminated water can enter the distribution system and house connections through poorly made connections, for instance, the priority should normally be to replace pipes and improve drainage rather than providing better water treatment.

3. **Take account of operational realities**. Consider how the system will be operated and design accordingly. So, for instance, the peak factor adopted for a system to which water is supplied for only a few hours per day will be much higher than the ‘normal’ figure of 2.5. However, providing full pressure at peak use is a luxury, and designs that allow for this will add to costs. Always remember that the amount of water that customers receive is not governed by notional levels of service but by the physical realities of the system to which they are connected. So, assumptions on service standards (per-capita water use, pressure etc.) should also be based on assessment of how the system can be most cost effectively operated.

4. **Design for easy maintenance**. The most theoretically cost-effective design is unlikely to be economical in the long term if it is not maintained, and maintenance is more likely to happen if the design allows for it.

5. **Consider the financial implications of investment decisions**. As already indicated, water supply systems should be designed to meet expected demand. This will generally mean that distribution systems are expanded incrementally based on modular designs, to meet demand. However, some judgement is required on considering how much excess capacity to allow for growth in demand. For example, reservoirs and water intakes may be better designed with a more ‘lumpy’ approach to investment (see Table 0.3.1).

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### Table 0.3.1 Modular approaches to design – recommended excess capacity

<table>
<thead>
<tr>
<th>Component</th>
<th>Explanatory Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provide Large Excess Capacity, &gt; 5 years</strong></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>Future availability</td>
</tr>
<tr>
<td>Reservoirs</td>
<td>Future availability, Economy of Scale</td>
</tr>
<tr>
<td>Water Intakes</td>
<td>Future availability, Economy of Scale</td>
</tr>
<tr>
<td>Sewers</td>
<td>Compatibility, Economy of Scale</td>
</tr>
<tr>
<td><strong>Provide Some Excess Capacity, ~ 5 years</strong></td>
<td></td>
</tr>
<tr>
<td>Wells</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Network Diameters</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Pump Stations</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Treatment Plants</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td><strong>Provide Little or No Excess Capacity, &lt; 5 years</strong></td>
<td></td>
</tr>
<tr>
<td>Network Length</td>
<td>Uncertain location, Economy of Scale</td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>Uncertain location, Economy of Scale</td>
</tr>
</tbody>
</table>

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4 Lauria: *Appropriate Design for Town Water Systems.*
6. **Take account of the availability and cost of capital.** This principle provides a caveat to the previous principle. Government should underpin business planning approaches for town water supply and sanitation with suitable reform- or performance-based financing for towns that prepare business plans (see the “stepped approach” to upgrade of existing town water systems in Volume I, Chapter 3).

One consequence of the first three principles listed above is that the system should only be expanded when the service provided within the existing supply area is satisfactory. This point is considered later in this module in the section on strategic decision-making.

**Information and cost effective design**

For design to be truly cost-effective, it must be information-based. For instance, to take a simple case, it is not possible to specify a replacement pump to supply an existing transmission main without information on the length and diameter of the main, the elevations at the supply and delivery ends of the main and the characteristics of the various pump options.

This illustrates the point of basing design decisions on the best available information. The problem for designers is what to do when information is either not available or difficult to analyse. The obvious example of the first, which is also key to the business planning approach, is the need for information on future demand. Three key questions can be posed:

- How many people will want to be connected to the system?
- What type of connection will they want?
- How much water will they use?

Answers to these questions will be considered later in Module 1.5 Understanding the Market.

The second problem is that information may be available but difficult to analyse. (See Box 0.3.3). In such cases, it may be better to first introduce changes on a small scale and monitor the results in order to obtain the information required to decide whether or not to introduce change throughout the system.

**Box 0.3.3 The relationship between additional distribution mains and willingness to connect**

It is common practice for water utilities to provide water mains only along main streets and expect customers to pay for connections to these mains. Clearly, those living some distance from distribution mains have to pay more for a connection than those living close to mains. This suggests that willingness to connect is likely to reduce with increased distance from a main. The question for cost-conscious planners is whether the cost of laying additional distribution mains along side streets is likely to be justified by the additional connections generated.

If initial analysis shows that the majority of connections are along the streets with existing mains, the most likely explanation is that the cost of long connections is a deterrent to connections from elsewhere. This in turn suggests that there is a strong case for adding additional ‘infill’ mains within the existing supply area.

It is important to break distribution in town areas or zones, and carry out the analysis of technologies / investments against income / demand for each of these areas. Satellite communities and low-density fringe areas need particular attention. For each area designs should be cross checked against financial viability and willingness and ability to pay. Stakeholder (participatory) consultations are a critical first step to planning (see Module 1.1), and special attention must be paid to connection options and opportunities to make connection fees affordable (for example, through targeted subsidies).
Box 0.3.4: House connections (source: Volume I, Chapter 3)

It is through household connections that a water utility collects most of its revenue for domestic water supplies and sewer systems. A utility needs to have a strategy to provide water to all consumer groups with a service level that each can afford (social equity), while increasing the revenue base by providing as many house/commercial connections as possible. From the utility’s point of view, the goal is to increase the revenue base by increasing the number of connections and consumption. This is consistent with consumer preference for a system that provides water that is cheaper, more readily available, and of better quality than alternative sources. However, there is an important caveat. Experience shows that most leakage from water systems occurs through defective house connections. Because the individual leaks are relatively small, lots of connections must be repaired to have a significant effect on water savings, yet because there are so many leaky connections, the wasted water and the financial loss to the utility is substantial. The key message is that, in fostering optimum adoption of house connections, utilities also have to recognize the need for high quality materials and craftsmanship.

Factors that constrain and simplify supply side analysis

Table 0.3.1 above gives a summary of recommended excess capacity. (The terms short-term, medium-term and long-term are used here in the small town context to denote less than 5 years, 5 years, and more than 5 years respectively). In adopting a modular approach some practical implications for cost-effective design are as follows:

- Design borewells and tubewells to meet short- to medium-term demand but plan to add others as demand increases. Some excess capacity (additional wells) may be needed to cover for times of mechanical breakdown or maintenance.
- Design reservoirs and water intakes for medium- to long-term demand, taking account of future availability of land and water sources, and economies of scale in construction.
- Design treatment facilities to meet medium-term demand, and consider the options for uprating to meet future demand. This uprating might be achieved by adding new units in accordance with an overall design based on modular units.
- Design pumping facilities for the medium-term to allow replacement/uprating of pump sets in the future, but also allow some back up to cover for mechanical problems or maintenance. This may require that pipework is designed for medium to long-term demands but this cost will be relatively small compared with overall civil works costs. Where pumps operate for a limited number of hours each day, the best way to increase future capacity may be to increase the number of hours for which pumps are operated. It may be appropriate to link future increases in pump operating times to action to provide new/additional elevated storage capacity.
- Design transmission mains for the likely long-term demand, particularly when the main will be difficult / expensive to duplicate (but remember that it is pipe length more so than pipe diameter which pushes up costs).
- Design elevated storage reservoirs/tanks to meet short-term demand. Where existing demand is low and funds are likely to be available in the future, it may be appropriate to delay construction of the facility until demand has increased sufficiently to require the reservoir. Additional storage facilities should be built only when the demand is known in terms of both location and water consumption.

Provide tertiary distribution mains in accordance with minimum size criteria in response to current short-term demand, using evidence from connection applications and/or social surveys to gauge demand.
0.3 – **PRINCIPLES FOR COST EFFECTIVE DESIGN AND OPERATIONS**

This module sets out key principles for cost effective design and operations. The material on cost effective operations is intended for town utility operators. The material on cost-effective design will primarily be of use for consultant engineers but also for town utility staff responsible for overseeing those consultants.

The material is presented in terms of the four functional areas: routine operations, business planning, efficiency improvement and expansion.

**Module content**
- Routine operations activities
- Business planning activities – strategic decisions
- Principles for conducting operational efficiency activities
- Cost effective design for service improvement and expansion

### 0.3.1 – **ROUTINE OPERATIONS ACTIVITIES**

Routine operations are defined here as the tasks that a local operator with basic training is capable of handling. Such tasks are routine in the sense of being carried out on a regular basis, and in the sense of being straightforward. Routine tasks are distinguished from specialist services which require a higher level of professional experience and skill, and which tend to be periodic.

The routine activities required to operate and maintain a water supply system include the following:

- *Meter reading* (where meters are provided)
- *Billing and collection*
- *Accounting*
- *Routine operational and maintenance*[^5]
- *Monitoring production, water quality and customer satisfaction*
- *House connections*
- *Stores*

The personnel required to carry out these tasks may be employed directly by the Corporate Oversight Body, COB, by an operator contracted by the COB, or by specialist services providers. The important strategic decisions relate to the mix between these options.

Larger utilities may employ specialist staff, e.g. a person with direct responsibility for responding to customer complaints. For smaller utilities, these roles will normally be fulfilled by one of the management team or staff with broader job specifications.

### 0.3.2 – **BUSINESS PLANNING ACTIVITIES: STRATEGIC DECISIONS**

[^5]: Routine O & M includes: valve inspection and exercising, water main cleaning and flushing, pipe location and leak detection, emergency repairs and other minor works, meter maintenance, O & M of storage facilities, O & M of pumps, record keeping for pipe network maintenance
The core theme of the main Guidance Manual deals with the business planning process, and step 2 materials with preparation of the business plan, and this is not discussed in detail here. It is noted, however, that in general, strategic decision-making will be the responsibility either of the corporate oversight body together with the operations manager of the town utility, or the contracted operator. Decisions may be based on information obtained by consultants but ultimate responsibility for making decisions should normally rest with the corporate oversight body or the operations manager of the utility.

Execution of routine operational tasks is absolutely essential to the effective and efficient operation of the water supply system. However, operational effectiveness and efficiency can only be sustained in the long-term if managers take the right strategic decisions. These decisions (business planning activities) relate to: customer demand assessments, investment planning, securing professional support, financial modelling, tariff setting, funding applications and borrowing, and monitoring and evaluation. These activities are discussed in detail in different modules, in particular Modules 1.3 to 1.6, and Modules 2.1 and 2.2).

Three key strategic decisions directly relating to operational activities are:

- The types of facilities provided;
- The human resources required to ensure the sound operation and long-term viability of the system;
- The balance between maintaining good services to existing customers and extending services to new customers;

Types of facilities provided - The choice between different types of facility will obviously be influenced by their capital and running costs. Another important point to consider when deciding what type of facility is to be provided is whether or not it can be easily maintained with resources that are likely to be available. The importance of matching design with financial viability and customer willingness and ability to pay is emphasised throughout the business planning process.

Human resource requirements - Strategic decisions with regard to human resource requirements will mainly be about whether to bring in new people, whether as employees or contractors, in response to changing circumstances and new needs. When considering human resource requirements, start with the ‘strategic’ management posts, without which it will be difficult to ensure that effective systems are sustained. Is there currently an overall operations manager and a finance manager? If not, is there a need to create such posts and/or recruit people to fill them? After this, consider the human resource requirements relating to routine activities.

Where adequately trained staff are not available, it will be necessary to develop a human resource development strategy. This might involve training but could also involve bringing in needed skills from the private sector. Training and capacity development should not be seen as an afterthought to the strategic plan but rather as an integral part of the plan.

Service improvements versus service extension - Strategic planners need to take account of the costs and likely benefits of investments. One particular aspect of this is the assessment of the balance to be struck between improving services to existing customers and extending services to new customers. In general, where existing services are poor, the initial focus should be on improving these services. Where existing services are adequate, the strategy may include efforts to both increase the number of connections in the existing supply area and extend services into new areas. Whenever considering system extensions, it will be necessary to consider the investments required at all points in the system hierarchy to support them. It will also be necessary to ensure that there is demand for services in the targeted areas. These points are brought together in a decision tree in Figure 0.3.1 below.
What is operational efficiency?

Engineers define operational efficiency as the output produced from an asset (normally a piece of plant or equipment) divided by the output that would have been produced from the asset over the same period if it had been operating at its optimum or rated capacity. In relation to the system as a whole, operational efficiency can be defined in terms of the need to minimise the expenditure required to ensure that citizens receive acceptable quality water at an affordable price in sufficient quantity to meet demand. Water supply managers need to be concerned with both the operational efficiency of individual system components and the way in which the performances of these components combine to define the operational efficiency of the water supply system as a whole.

The importance of having a focus on operational efficiency cannot be overstated. For example, in many small town situations there is pressure on engineers to augment source works to increase production capacity and put more water in the system. In fact, it may be that there is already sufficient production capacity, but that unaccounted for water is very high, or some other malfunction within the pipe network is creating a loss of pressure. A focus on efficiency can therefore often help reduce investment costs, and improve financial viability as well as service quality.

How can operational efficiency be measured?

While it should be possible to directly measure the operational efficiency of individual components such as pumps, it will normally be necessary to assess the operational efficiency of the system as a whole through a series of performance indicators. Indicators that relate directly to financial and technical operational efficiency include, for example:

- Operating expenses / m3 into supply;
- Unit energy use (energy expenses / m3 into supply);
• Unaccounted for water.

Most importantly these indicators should be monitored in terms of their trend, i.e improvement over time.

Indicators that relate to the outcomes (impact on consumers) achieved through improved operational efficiency include, for example:

• Duration of supply: number of hours per day for which water is supplied;
• Pressures at specified points in the system;
• Number of unscheduled interruptions in supply lasting an hour or more.

(⇔ A complete list of key indicators is provided in Module 3.3)

**Options for improving operational efficiency**

Some basic principles for improving operational efficiency are briefly discussed below:

• **Ensure timely repair and maintenance of system components;**
• **Improve collection performance: ensure that all water users are billed and that bills are paid promptly.** This is important because income depends on bills being issued and paid while good operation and maintenance are dependent on the water utility having sound finances;
• **Maximise use of least-cost resources.** This is relevant where a system is supplied from more than one source. If there is a choice, the aim should always be to maximise the use of water from the lower cost resource or resources. (See example below).

**Box 0.3.1. Maximising the use of least cost resources – an example from India**

The town of Tirupati in Andhra Pradesh receives water from two sources. The older source is a reservoir located in the hills above the town, from which water gravitates to the town. This has insufficient capacity to serve the town as a whole and has been supplemented by water drawn from a canal some 40km away. From the intake point, water is pumped up to a holding reservoir from which it is pumped via a number of intermediate pumping stations to the town. The production cost of water from the original reservoir is clearly much less than that from the new source. At present, each source serves a particular zone within the town. Use of the original source is limited by the fact that a minimum volume of water has to be left in the reservoir at all times and inflow to the reservoir is dependent on rainfall and so varies from year to year. Nevertheless, given the low cost of reservoir water, a sound operational strategy should aim to maximise the use of this source. This may require some expenditure to reconfigure the water distribution system to allow some areas to be supplied from either of the two sources. The strategy will also benefit from action to minimise leakage along the transmission main linking the reservoir to the town.

• **Reduce wastage: including unaccounted for water and power and chemical usage.** This applies not just to wastage of water in the form of leakage but also to other forms of wastage. It might be, for instance, that reorganisation of the arrangements for preparing and issuing water bills could enable the time of those charged with the task to be used more efficiently. Better management of water treatment facilities might enable filter runs to be increased and so reduce the amount of water used for backwashing. Inefficient chlorination methods not only waste chlorine but may also lead to deterioration and premature failure of clearwater and reservoir tank roofs because of corrosion caused by excess free chlorine;

• **Focus on problem solving: identify ‘weak’ points in the system and take remedial action.** An example of a weak point would be a water main or pump that fails regularly and so compromises the overall performance of the system;

• **Effective procurement services for goods and chemicals.** Reliable and cost effective sources should be established to keep costs of goods and services to a minimum;
• **Secure necessary technical and financial management training.** This is often overlooked as an expense that can be foregone. But ongoing training is critical so that professional and operating staff can deal with the challenges of improving operational efficiency.

• **Improve monitoring (production, water quality, customer satisfaction), and performance indicator analysis.** The collection of information and analysis of performance indicators will help to show the effects that other activities are having on overall operational performance. This in itself is an important motivator for improving efficiency.

### The importance of information and the need for appropriate instrumentation

One point that is common to all these options for improving operational efficiency is their dependence on information. Without information, it is impossible to make sound operational decisions. So, any strategy for improving operational efficiency must take account of the need to gather relevant information and then use that information effectively. This, in turn, means that the strategy must ensure that appropriate instrumentation is in place, that instruments and meters are read and that appropriate operational decisions are made on the basis of those readings. At the very least, the following instruments and meters should always be installed and operational:

- Bulk flow meters on all production facilities, on transmission mains and at the points where water is delivered to individual supply zones
- Ammeters, voltmeters and pressure gauges on all pumps.
- Head loss gauges on filter beds.
- Level gauges on all service reservoirs.

These should be regularly read and operators should be trained in basic analysis and use of the data obtained from these instruments. For instance:

- Bulk flow meters can be used, with information on the number of connections in specific supply zones, to analyse where water is being used within the system. More immediately, comparison of flows day on day will reveal any significant increase in flow, which might be indicative of a major leak in the system.
- Ammeter and voltmeter readings indicate that a pump-set is operating within its intended range. Changes may indicate a need to investigate the need for repairs and/or maintenance.
- Head-loss gauges on rapid gravity filter beds should be used to indicate when the filter needs to be backwashed. If the head loss remains high despite frequent backwashing, it is probable that the filter sand needs to be replaced.
- Level gauges on service reservoirs provide a simple way of assessing when the reservoir is full and are thus useful for routine operational purposes.

### 0.3.4 – Cost Effective Design for Service Improvement and Expansion

Having considered routine operations, business planning and operational efficiency, the last key functional area to consider is expansion. The key principle is the need for cost effective design.

**Why design needs to be cost effective**
Developing countries in general and small towns in particular have limited financial resources. It is therefore important that the resources that are available are used as effectively as possible. One particular aspect of this need is that designs should be cost effective. In other words, they should achieve desired objectives at lowest cost that is compatible with the achievement of those objectives.

### Box 0.3.2: Key principles of cost effective design

In Volume I, Chapter 3, the following key principles are identified:

- Water supply and sanitation services need to be sustainable in both short and long term. Towns should therefore plan for the current population, but should also plan to expand the system gradually based on actual demand. Key elements of a design strategy are:
  - Design of service level based on customers’ willingness / ability to pay;
  - Phased expansion and sequential upgrades corresponding to demand;
  - Connection policies designed to increase the number of household connections;
  - Government promotion of affordable design – regulations and design standards, and guidelines for design, connection policy and stakeholder consultation; and
  - Systems and technologies appropriate to local capacity and culture.

- Design of facilities and cost-recovery measures should be developed in consultation with present and prospective users of water supply and sanitation services.

In particular, there is a need to realistically evaluate income (demand) against the costs of particular technologies / investments, and to take account of the uncertainty of growth in individual towns. The emphasis should therefore be on assessing the current demand and use of shorter planning horizons (around 5 years), with modular designs to accommodate future expansion and sequential improvements over time. The connection policy should include options for both individual and shared connections, as well as kiosks and standpipes. The extension policy should address those living in low-density peripheral areas and satellite communities, with consideration given to the relative cost of boreholes fitted with handpumps in peripheral areas and separate sources for satellite communities. Box 0.3.2 provides some key principles identified in the Volume I report, and the reader is referred to Volume I, Chapter 3, for further information.

**Cost effective design and overall objectives**

The overall objective of any water supply operation is to provide a satisfactory service to customers. So, cost effective design must take account of the likely impact of new facilities on the service provided to current and potential future customers. This raises the questions of who are the customers and what strategy should be taken to improving the service provided to them.

Existing customers clearly must live within the area covered by the existing water distribution system. Potential future customers fall into two broad categories:

- Those that live within the area covered by the existing distribution system, who could therefore connect if they so wished.
- Those who can only be served if the distribution system is extended.

The objective of water supply improvements may be to:

4. Improve levels of service in areas served by the existing piped water supply system.
5. Extend the system to allow new connections in currently unserved areas.
6. A combination of the two

Where service levels in currently supplied areas are already good, the possibility of extending
Where existing service levels are poor, improvements in the level of service in existing supply areas may be a necessary establishment the credibility of the utility and a precondition for existing customers to pay the higher tariffs that are required if the water supply operation is to be financially viable. They may also encourage those who have not previously taken connections to connect to the system. Before any significant investment is made in a town, government should check that an oversight body and operator exist and are performing satisfactorily. If necessary, small, targeted investments should be made to improve performance and increase production. Thereafter, services can be extended to new areas.

Whatever the short-term strategy, the long-term aim should be to ensure that everyone in the town has access to safe water in sufficient quantity to allow good hygiene. 6 This does not mean that everyone in the town has to have access to the piped water supply. For instance, households that have access to reasonable quality shallow groundwater may choose not to connect, but can be offered a shared connection or public standpipe as an improved service.

**Basic principles of cost effective design**

In addition to the key principles highlighted in Box 0.3.2, other basic principles for cost-effective design include.

6. *Take account of existing facilities.* Few towns will be without an existing water supply scheme, even if in some cases it is currently non-operational. Wherever existing facilities are in good condition, the aim should be to supplement rather than replace them.

7. *Understand the system and its components* Water supply systems consist of a number of basic components, arranged in a hierarchical system. When considering the options for improving/extending services, it will be important to understand the roles of the different components, the way in which they are linked and the location of problems and bottlenecks within the system. For instance, low pressure at a consumer’s tap might be caused by a long small diameter house connection, inadequate distribution mains, inadequate pressure from pumps or an elevated storage tank or a general shortfall in supply in relation to demand. The key to making cost-effective improvements is identifying the cause or causes of low pressure and taking action to deal with them.

Understanding the system, its components and the possible sources of contamination is also important when considering the options for improving water quality. Where contaminated water can enter the distribution system and house connections through poorly made connections, for instance, the priority should normally be to replace pipes and improve drainage rather than providing better water treatment.

8. *Take account of operational realities.* Consider how the system will be operated and design accordingly. So, for instance, the peak factor adopted for a system to which water is supplied for only a few hours per day will be much higher than the ‘normal’ figure of 2.5. However, providing full pressure at peak use is a luxury, and designs that allow for this will add to costs. Always remember that the amount of water that customers receive is not governed by notional levels of service but by the physical realities of the system to which they are connected. So, assumptions on service standards (per-capita water use, pressure etc.) should also be based on assessment of how the system can be most cost effectively operated.

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6 ‘Sufficient quantity’ might mean 20 litres per person per day in areas without water-borne sanitation and 30 litres per person per day in areas with water-borne sanitation although there are likely to be some regional differences in what is considered acceptable.
9. **Design for easy maintenance.** The most theoretically cost-effective design is unlikely to be economical in the long term if it is not maintained, and maintenance is more likely to happen if the design allows for it.

10. **Design to meet actual demand.** As already indicated, water supply systems should be designed to meet actual demand. This will generally mean that distribution systems are expanded incrementally based on modular designs, to meet demand. However, some judgement is required on considering how much excess capacity to allow for growth in demand. For example, reservoirs and water intakes may be better designed with a more ‘lumpy’ approach to investment (see Table 0.3.1).

<table>
<thead>
<tr>
<th>Component</th>
<th>Explanatory Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Large Excess Capacity, 15 years</td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>Future availability</td>
</tr>
<tr>
<td>Reservoirs</td>
<td>Future availability, Economy of Scale</td>
</tr>
<tr>
<td>Water intakes</td>
<td>Future availability, Economy of Scale</td>
</tr>
<tr>
<td>Transmission mains</td>
<td>Compatibility, Economy of Scale</td>
</tr>
<tr>
<td>Provide Some Excess Capacity, 7-8 years</td>
<td></td>
</tr>
<tr>
<td>Wells</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Network diameters</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Pump stations</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Treatment plants</td>
<td>Economy of Scale, Reliability</td>
</tr>
<tr>
<td>Provide Little or No Excess Capacity, current population</td>
<td></td>
</tr>
<tr>
<td>Network length</td>
<td>Uncertain location, Economy of Scale</td>
</tr>
<tr>
<td>Storage tanks</td>
<td>Uncertain location, Economy of Scale</td>
</tr>
</tbody>
</table>

6. **Take account of the availability and cost of capital.** This principle provides a caveat to the previous principle. Government should underpin business planning approaches for town water supply and sanitation with suitable reform- or performance-based financing for towns that prepare business plans (see the “stepped approach” to upgrade of existing town water systems in Volume I, Chapter 3).

7. **Compare investments to the return on those investments.** In designing a town water supply the town should be broken down into service areas or zones, and an analysis of technologies, investments against income, and water demand should be carried out in each area. Satellite communities and low-density fringe areas need particular attention. For each area designs should be cross checked against financial viability and willingness and ability to pay. Similarly, the cost of house connections or yard taps should be weighed against the willingness/ability of customers to repay the installation cost over time and to use and pay for more water. Stakeholder (participatory) consultations are critical to planning (see Module 1.1), and special attention must be paid to connection options and opportunities to make connection fees affordable (for example, through targeted subsidies).

8. **Information and cost effective design.** For design to be truly cost-effective, it must be information-based. For instance, to take a simple case, it is not possible to specify a replacement pump to supply an existing transmission main without information on the length and diameter of the main, the elevations at the supply and delivery ends of the main and the characteristics of the various pump options.

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7 Lauria: *Appropriate Design for Town Water Systems.*
This illustrates the point of basing design decisions on the best available information. The problem for designers is what to do when information is either not available or difficult to analyse. The obvious example of the first, which is also key to the business planning approach, is the need for information on future demand. Three key questions can be posed: (i) How many people will want to be connected to the system? (ii) What type of connection will they want? (iii) How much water will they use? Answers to these questions will be considered later in Module 1.5 Understanding the Market. Similarly, the indicators used to assess the performance of the require basic information which may not be available because of the lack of instrumentation. Early on in the planning process, as part of the initial effort to improve operations, key meters should be purchased.

The second problem is that information may be available but difficult to analyse. (See Box 0.3.4). In such cases, it may be better to first introduce changes on a small scale and monitor the results in order to obtain the information required to decide whether or not to introduce change throughout the system.

Box 0.3.3 House connections (source: Volume I, Chapter 3)

It is through household connections that a water utility collects most of its revenue for domestic water supplies and sewer systems. A utility needs to have a strategy to provide water to all consumer groups with a service level that each can afford (social equity), while increasing the revenue base by providing as many house/commercial connections as possible. From the utility’s point of view, the goal is to increase the revenue base by increasing the number of connections and consumption. This is consistent with consumer preference for a system that provides water that is cheaper, more readily available, and of better quality than alternative sources. However, there is an important caveat. Experience shows that most leakage from water systems occurs through defective house connections. Because the individual leaks are relatively small, lots of connections must be repaired to have a significant effect on water savings, yet because there are so many leaky connections, the wasted water and the financial loss to the utility is substantial. The key message is that, in fostering optimum adoption of house connections, utilities also have to recognize the need for high quality materials and craftsmanship.

Box 0.3.4 The relationship between additional distribution mains and willingness to connect

It is common practice for water utilities to provide water mains only along main streets and expect customers to pay for connections to these mains. Clearly, those living some distance from distribution mains have to pay more for a connection than those living close to mains. This suggests that willingness to connect is likely to reduce with increased distance from a main. The question for cost-conscious planners is whether the cost of laying additional distribution mains along side streets is likely to be justified by the additional connections generated.

If initial analysis shows that the majority of connections are along the streets with existing mains, the most likely explanation is that the cost of long connections is a deterrent to connections from elsewhere. This in turn suggests that there is a strong case for adding additional ‘infill’ mains within the existing supply area.

Factors that constrain and simplify supply side analysis

Table 0.3.1 above gives a summary of recommended excess capacity. At a 3% rate of growth the population will increase by 25% in 7-8 years, by 50% in 15 years, and 100% (double) in 25 years. The terms short-term, medium-term and long-term are used here in the small town context to denote the current population, the population after 7-8 years, and 15 years respectively. In adopting a modular approach some practical implications for cost-effective design are as follows:

- Design borewells and tubewells to meet short- to medium-term demand but plan to add others as demand increases. Some excess capacity (additional wells) may be needed to cover for times of mechanical breakdown or maintenance.
• Design reservoirs and water intakes for medium- to long-term demand, taking account of future availability of land and water sources, and economies of scale in construction.

• Design treatment facilities to meet medium-term demand, and consider the options for expanding to meet future demand. This expansion might be achieved by adding new units in accordance with an overall design based on modular units.

• Design pumping facilities for the medium-term to allow replacement/uprating of pump sets in the future, but also allow some back up to cover for mechanical problems or maintenance. This may require that pipework is designed for long-term demands but this cost will be relatively small compared with overall civil works costs. Where pumps operate for a limited number of hours each day, the best way to increase future capacity may be to increase the number of hours for which pumps are operated. It may be appropriate to link future increases in pump operating times to action to provide new/additional elevated storage capacity.

• Design transmission mains for the likely long-term demand, particularly when the main will be difficult / expensive to duplicate (but remember that it is pipe length more so than pipe diameter which pushes up costs).

• Design elevated storage reservoirs/tanks to meet short-term to medium-term demand. Where existing demand is low and funds are likely to be available in the future, it may be appropriate to delay construction of the facility until demand has increased sufficiently to require the reservoir. Additional storage facilities should be built only when the demand is known in terms of both location and water consumption.

• Provide tertiary distribution mains in accordance with minimum size criteria in response to current short-term demand, using evidence from connection applications and/or social surveys to gauge demand.
The purpose of this module is to guide local consultants through the evaluation of the policies and legal framework and to gather data at a national level, prior to conducting the analysis at town level.

Sometimes the country will be undergoing a reform process, and so consultants must start from the basic policy and propose improved institutional, financial and design arrangements (the Volume I reports, Principles of Town Water Supply and Sanitation and Guide to Strategic Planning for Improved Sanitation in Small Towns, provide useful background reading).

Module content
- Analyzing national policies and legal frameworks
- Gathering data at national level

0.4.1 - Analyzing National Policies and Legal Frameworks

Why do you need to analyse national policies and legal frameworks?

Given that town water sector functions (policy making, regulation, corporate oversight, and service provision) may be allocated in different ways depending on the country, consultants in charge of conducting the analysis at town level should start by reviewing what the national policies and legal frameworks require or at least, the options they set out for local level management of water services.

The country as a whole may be going through a reform process, which could lead to important changes for the institutional arrangements at town level. The consultants will therefore need to consider what improved institutional, financial and design arrangements will be needed, and be alerted to the type of legal provisions they should be looking for in order to formulate the right advice at town level. This assessment can of course be used for several towns: there would therefore be some clear benefits if the same team of consultants works in several towns, so as to spread the costs of this initial assessment.

LOOK OUT!
This initial assessment may reveal that adopting a business planning approach at town level is not appropriate at this point in the country's water sector reforms. In that case, the business planning approach may still be adopted in some towns on a pilot basis, to demonstrate the utility of the approach or the Government may use this Manual to reform the prevailing institutional, financial and design framework.

What documents should you review prior to going to the town level?
The consultants should review all documents existing at the national level that can have an impact on reforms at town level. These would typically cover laws in the following areas:

- Water and sanitation services;
- Decentralization and local government issues, including finance and procurement;
- Private sector participation in infrastructure;
- Service standards;
• Water resources and environmental legislation;
• Design standards.

When reviewing the national framework, the consultants should also seek to ascertain what the national government’s strategies are for reforming the water sector, in order to evaluate the applicability of the business planning approach and identify sources of support for the local level available at the national or regional levels.

**Water and sanitation services**

Most countries have a national water supply and sanitation policy and some have a separate national sanitation policy. In some cases, national policy may be reflected in policies prepared at the state/provincial/regional level. Collect copies of any relevant policies and assess them.

The “National Water Policy” would typically provide an overall framework for the water sector and directions for reforms. A national policy is a guidance document adopted at national level which determines reform options or directions at town level, as well as principles for determining water supply standards and tariffs. Such a document would define overall objectives for extending access to water and sanitation services at national level, usually in line with the water-related Millennium Development Goals (MDGs). It would outline the role of government agencies and local government and would include details of the government’s policy with respect to private sector participation in water services.

The national policy would usually be reflected in a legal framework for the water and sanitation sector, which should not be confused with the legal framework for the management of water resources. However, a legal framework for water services does not always exist because such pieces of legislation are often politically sensitive and take time to be adopted. When they exist, they are not always applied in practice.

The consultants will therefore need to understand what is called for (by the national policies or legal frameworks) and what is required (in practice) to be implemented at town level.

If it exists, the “Water and Sanitation service law” would usually reflect the policy objectives and translate them into a binding legal framework. It would clarify the responsibilities of the main actors (including policy-making for the line Ministry, regulation – which may be shared between various institutions, and service provision) and define broad-tariff setting principles. If a national water sector regulator is set up, it would usually be done through that same sector law. This law can also define the ownership and management structure of local water services (such as rules on the establishment of autonomous town Water Boards for example) and reflect the policy on private sector participation.

The water and sanitation services policy (and/or law) should be scrutinized for the following:

• **Service objectives and targets** - Understand what the national objectives for the water sector are, particularly with respect to service standards, expanding coverage and setting tariffs (for example, what is the Government’s interpretation of “cost-covering” tariffs?) - how are these likely to translate into action required at the local level?

• **Allocation of responsibilities** - Understand how responsibilities for water and sanitation services in towns are distributed between Ministries within the national government and between local level and national governments.
  o **Planning and design vs. operations** - It will be important to be clear about where responsibilities lie for planning and design and operation and maintenance. In some countries, planning and design is assigned to a specialist department such as the Public Health Engineering Departments found in some Indian states and Pakistan provinces. In most countries, responsibility for the day to day operation and management of water supply and drainage/sewerage services rests with a
municipality, which falls within the influence of either a local government or an urban ministry. So, different organisations may be responsible for planning and design and operation and maintenance. This needs to be taken into account when considering the details of the business planning process.

- **Water vs. sanitation** - It will often, although not always, be the case that responsibility for water supply and sanitation rests with different ministries, or that water supply is delegated to a Water Board and/or private operator, while sanitation remains a municipal and household responsibility. The consequences of this for the planning process would need to be investigated. Responsibilities for the provision of in-house sanitation facilities usually rest with individual households but the legal assessment should also consider the situation with regard to ‘public’ facilities such as drains and public/communal toilets at neighbourhood or municipal level.

Record information on institutional structures in the form of one or more organizational charts, showing the links between different ministries, departments and agencies. This will help you to understand where ultimate responsibilities lie and provide information on which ministry or ministries to approach if action is required to change policy.

- **Institutions for regulation** - Understand whether a national regulator has been established and whether it has responsibilities over small towns (in some cases, a national regulator has been established with responsibilities for all urban service providers but it only has the capacity to regulate the larger cities). Options for local models of regulation of service provision (in particular improved approaches to gathering information and monitoring / audit of performance, and other basic requirements of the owner such as monitoring water quality, abstraction / discharge etc.) are discussed in Module 0.2.

- **Tariff setting** - Assess the tariff setting principles contained in the legislation: can they be directly implemented or would they require interpretation at town level? How realistic are they? What does the law say about the provision of subsidies to poor people? How much local autonomy is there to set tariffs based on business plans?

- **Dynamics of market structure reform** - Evaluate the dynamics of market structure reform at national level, including the policy climate regarding the establishment of local private operators and specialist services support to independent small towns. Are operators being encouraged to start up and expand their business? For example, are there arrangements to support routine operators and/or corporate oversight bodies with periodic specialist support, or are there measures taken to bundle towns so that operators can achieve economies of scale even if they have separate contracts with individual towns? Or if the national policies call for the formation of regional utilities, for example, evaluate what the texts say about forming aggregated entities, i.e. grouping several towns for the provision of water services (also referred to as “clustering”): does the law mandate aggregation, does it provide financial incentives for the towns to aggregate or does it simply encourage it? (_module 2.1 for more detailed discussion on the different professional support options).

**Look Out!**

When trying to ascertain the legal framework for aggregation, the consultant should review all relevant legislation and not only the water services legislation as this may be too narrowly focused. For example, in Tanzania, even though the National Policy clearly calls for clustering of town water utilities, some claim that the possibility for aggregation is highly limited by the fact that small towns and larger towns (where water services are better organized) fall under the responsibility of different Ministries. This is by no means a clear legal barrier but is definitely perceived as an institutional barrier to aggregation.

- **Appeal mechanisms** - Evaluate whether appeal mechanisms are in place: if a customer is not satisfied with the service provided locally, or a local service provider feels hard done by a local regulator, what means of recourse exist, potentially at a higher level of government?
**Management models** - It will be important to review what management model water service providers can adopt depending on the overall legal framework, i.e. Municipal Water Department, autonomous town Water Board, Water User Association or private water companies. These management options are briefly summarised in Table 0.4.1 below. The Volume I report and the Volume III case studies provide more information on alternative management models for water services.

The legal framework under which the entity operates is important. Some operate under public law, others under commercial. Typically public law limits the flexibility of the service provider in the critical areas of procurement and staff management, while reducing the rigor associated with reporting and accounting. Entities operating under commercial law will have greater obligations in relation to reporting of audited financial statements, yet have much greater flexibility in procurement and staff management.

**Table 0.4.1 - Summary of five management models commonly found in towns**

<table>
<thead>
<tr>
<th>Model</th>
<th>Water Association</th>
<th>(Ring-fenced) Municipal Water Department</th>
<th>Water Board</th>
<th>Small-scale Private Water Company</th>
<th>Share corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership</td>
<td>Town / Water Association</td>
<td>Town</td>
<td>Town / Water Board</td>
<td>Owner-Manager, and/or shareholders</td>
<td>Various models</td>
</tr>
<tr>
<td>Corporate Oversight</td>
<td>Executive committee of Association</td>
<td>Town Council water committee</td>
<td>Board of Directors</td>
<td>Owner-Manager</td>
<td>Board of Directors</td>
</tr>
<tr>
<td>Operations</td>
<td>System manager and staff, or private operator</td>
<td>Municipal Water Department</td>
<td>System manager and staff, or private operator</td>
<td>Company staff</td>
<td>Managing Director and operating staff</td>
</tr>
<tr>
<td>Who controls decision making?</td>
<td>End-users</td>
<td>Mayor / Town Council</td>
<td>Stakeholders represented on the Board</td>
<td>Owner-Manager, and/or shareholders</td>
<td>Board, Managing Director, and/or shareholders</td>
</tr>
<tr>
<td>Legal status</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Commercial</td>
<td>Quasi-commercial</td>
</tr>
<tr>
<td>What sizes of towns?</td>
<td>Rural small towns and ‘satellite’ communities</td>
<td>All sizes of towns</td>
<td>All sizes of towns</td>
<td>Typically start in small towns, but expect to grow</td>
<td>Medium-sized and large towns</td>
</tr>
</tbody>
</table>

**Decentralization and Local Government issues**

The “Local Government Act” would typically transfer responsibility for the delivery of many “local” services from central government to local authorities, and this would usually be relevant for water (and sanitation) services. When reviewing this act, the local consultant would need to evaluate the following:

- Are decentralized responsibilities accompanied by matching financial resources and decision-making powers (e.g. to raise revenues from tariffs, fees and borrowing)?
- Who is now responsible for town water supply and sanitation services, in theory and in practice?
- Do decentralized institutions have the capacity to carry out the duties assigned to them? If not, what arrangements, if any, are being made to provide capacity, at least in the short term?

Note that in many cases, broad responsibilities are transferred (on paper) to the local governments with no adequate financial resources to carry them out: this can often result in deteriorating service quality rather than an improvement.

In some cases, the local authority would be given the responsibility for organizing the water service, but cannot provide the service directly through a municipal body, and is therefore obliged to delegate management to an independent entity, which could be an Water Use Association, a Water Board, a private water company / individual (this is the case of small towns in Mali or Senegal). This needs to be clearly identified if that is the case.

**LOOK OUT!**

It is quite common to encounter contradictions between the water services law and other pieces of legislation, such as the decentralization legislation. In many countries, the decentralization law would require that responsibility for water services be delegated to local governments whereas the water service law would maintain a centralized grip over water services, through a national state-owned or regional water authority for example.

If contradictions between the water and sanitation law and the local government legislation are encountered, the Consultant would need to get additional guidance at the central level in order to know what options can be proposed at the local level. One of the main reasons for such contradiction, in general, would be linked to the central government's reluctance to transfer responsibilities for water (and sanitation) services to local governments when they do not trust the local governments to have sufficient capacity to manage the services efficiently. There would also be historical and financial factors involved: if the central government has traditionally invested in all water sector assets, it would be reluctant to transfer the ownership of such assets to the local government, or conversely the local government may refuse to take responsibility for a system (and financing) that has not been designed in a participatory manner.

Centralized design departments tend to focus on schemes to augment existing supplies rather than to develop existing facilities in a cost-effective way. As a result, funds come in large tranches and the focus is often on building new production, transmission and storage facilities rather than mending leaks, replacing worn-out pumps and extending the distribution system and subsidizing connections. Where this is the situation, it will be very hard to develop an effective approach to incremental system improvement and expansion. The worst situation is likely to be that in which responsibilities for design are decentralized to local offices but the approach, norms and standards to be followed are set by the centre. Such arrangements tend to foster a conservative approach to planning and design and may make it hard to introduce a more integrated and cost-effective approach to system development. So, investigations of the overall context should consider the compatibility of existing institutions with a cost-effective approach to system expansion. In the event that existing institutions are not compatible with such an approach, options for reform and restructuring should be explored. For instance, it may be worthwhile to investigate the possibility of providing a separate finance line and setting up a specialist cell within an existing department to deal with demand for small-scale incremental improvements in existing systems.

The proposed approach of linking national government financing to institutional reforms and improved performance at the local level (the "stepped approach", see Volume I, chapter 3) can help reduce some of these concerns and could act as an effective tool for implementing decentralization of water service management in practice. This can be done through the signing of performance contracts between the local and central governments. One of the outcomes of
the business planning approach advocated in this manual would be the signing of such performance contracts between the local and central governments. This would reflect key content from the Business Plan and, together with operator contracts, would act as a monitoring tool for ensuring the implementation of the Business Plan.

**National government’s perception of local problems**

It is very likely that town water supply operations are hampered by a lack of capacity. This may relate to:
- Capacity to make informed management decisions
- Capacity to carry out routine operations effectively and efficiently.

Contextual investigations should include efforts to ascertain how potential capacity problems are viewed by the government at the centre:
- Are problems recognized and, if so, are there realistic plans and strategies to deal with them?
- What sector training institutions exist, what do they teach, how do they teach it and how effective are they in developing capacity? Assessment of resources at the centre will help to put local capacity-building proposals into perspective.

When assessing legislation, systems and procedures at the centre, you should also seek to evaluate the extent to which they allow the adoption of a business planning approach. The conditions for the adoption of such an approach include the following:
- Existing systems must at least have the potential to foster an information-based planning approach at the town level. In particular, the incentives handed down from the centre must be supportive of business planning.
- Where small towns are not financially autonomous, as will often be the case, financing systems to support incremental demand-responsive development must be in place.
- Small towns must be allowed to set their own tariffs. Indeed, systems should encourage them to increase tariffs while providing a better level of service.

**Private sector participation in infrastructure**

Some countries may have specific legislation that would define the forms of private sector participation that can be introduced in an infrastructure sector and the procedures for doing so. For example, some countries would explicitly prohibit the sale of water supply assets to the private sector and would therefore exclude divestiture as a private sector participation option. Others would seek to attract maximum private sector involvement even in those sectors. This is the case in Cambodia, for example, where local water services are mostly privately owned and managed.

The other important area to examine is the procedures that are specified for awarding the contract to a private operator. Some countries’ legislation may insist on competitive bidding with specific rules (with advertisement at national or international level for example). Others may accept direct contracting, but in very specific circumstances only (if an incumbent is already in place or if a call for tender has been organized but failed to generate interest).

Module 3.1 for more detailed discussion on the different “profiles” for operator contracts.

**Service standards**

The consultant will need to be familiar with all standards having an impact on system design and operations, including technical building standards and drinking water standards. They should also identify and understand any national level provision regarding the provision of water and/or sanitation services to households that do not have legal land tenure.
If technical standards are set too high to allow the modular approach to investment planning advocated in this manual, the Consultant should alert the national government of such rigidities and propose to operate on a pilot basis in the town under consideration.

**Water resources and environment legislation**

The consultant will need to review the water resource and environmental legislations as they would directly impact what is feasible (and what is not) from a technical point of view for expanding water resources at town level.

### 0.4.2 - Gathering data at national or regional level

Regional and national organisations may hold secondary information on individual towns, including reports on earlier studies, maps and plans, population data etc. which would be useful to gather prior to carrying out the analysis at town level.

The **most recent census** may be a good place to find information on population and perhaps service coverage, although census information on service coverage should be treated with caution. If possible, you should obtain historic population information, preferably from previous censuses, and use this to calculate the population growth rate. If census data is not available, it may be possible to obtain information from other sources but be aware that different surveys may have used different sampling methods and may not be compatible. Where there are discrepancies in existing data, it will be necessary to make a judgement on what to use and what not to use.

In some countries, state/provincial/regional planning departments may have better, more up to date **maps** than those held in towns. Where this is the case, try to obtain copies of the maps of the towns in which you are going to work.

Look for any **consultant reports** on the ‘target’ towns that may be available with national, state/provincial/regional and district ministries and departments. These may include useful background information. Do not confine yourself to recent reports. Old reports may provide useful information on the development of a town and its water supply and sanitation systems and provide information on previous initiatives. These may provide you with an idea of what is likely to work and where problems are likely to lie.

It is worth also referring here to Module 1.1 on participatory stakeholder consultations. Where possible, data gathered from higher level sources should be cross checked on site, through either qualitative or quantitative methods.
Business Planning for Town Water Services

Module 1
Identify Critical Issues and Prioritize Interventions
The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent.
1.1. **CONSULT LOCAL STAKEHOLDERS**

This module outlines an Information Systems (IS) strategy for town WSS, and provides the first part of the IS Strategy: a method for consulting primary stakeholders (consumers). Module 3.3 provides the second part of the IS strategy: a M&E framework for operational performance, and guidance on project progress monitoring (project milestones and outputs).

In this Module 1.1, the approach to consultation is to divide the town into service zones, and conduct focus group discussions using a simple “zonal scorecard” (water user survey) together with a limited household survey to cross check results.

The consultations are carried out at two stages of planning: (i) to conduct an initial demand assessment and baseline survey; and (ii) a follow up consultation to confirm that proposed interventions are those consumers want and will pay for.

Module 3.3 addresses M&E for operational performance, and project progress monitoring.

Module 3.1, annex 2, provides details of operator reporting requirements.

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**Module content**
- Overview of a Town WSS Information Systems Strategy
- Outline of the methodology for consulting primary stakeholders
- The consultation process in detail

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### 1.1.1 OVERVIEW OF A TOWN WSS INFORMATION SYSTEMS STRATEGY

Figure 1.1.1 below shows the three components of a Town WSS Information Systems (IS) strategy. The activities are tied to a five year business planning cycle, and annual assessment of operational performance. This module is concerned with consulting primary stakeholders, but also sets the scene for follow up M&E and project progress monitoring.

**Figure 1.1.1 The Town WSS Information Systems Strategy**

- **Consulting primary stakeholders**
  - Module 1.1 (see data required in boxes 1.1.1 and 1.1.2)
  - Zonal scorecards (focus groups) and limited hh surveys:
    - hh demand assessment and baseline survey – yr. 0
    - initial demand assessment
    - cross check proposed interventions
    - Impact assessment (progress against the baseline) – yr. 5

- **M&E for operational performance**
  - Module 3.3 (see table of performance indicators)
  - Module 3.1, annex 2, (see box on data required from the operator)
  - Annual zonal scorecards (focus groups) and operator reporting:
    - Impact on consumers (consumer satisfaction)
    - Financial performance
    - Operational performance

- **Project progress monitoring**
  - Module 3.3 (see table of performance indicators, and the critical list in Box 3.3.1)
  - Milestones and triggers (may be established for purposes of reform and performance based financing)
    - Milestones
    - Outputs
The proposed methodology for the initial demand assessment and baseline survey includes the following activities (see Figure 1.1.2 on the next page):

Preparation:
1. Carry out an initial collection of secondary data to gather background information on the town (see Box 1.1.2 for basic information on towns), and identify existing maps.

Initial meeting with town leaders
2. Introduce the project, discuss the formation/performance of the corporate oversight body, identify key informants, and obtain their views on critical problems relating to water supply and sanitation and proposed boundaries of service zones.

Initial consultation
3. Carry out a physical inspection of the water system, and prepare a map of the town service area; finalize boundaries of service zones; and identify zonal representatives from amongst primary stakeholders (households, businesses and institutions).
4. Prepare a simplified zonal scorecard (water user questionnaire) for use in focus group discussions and household surveys (see Box 1.1.3 for a set of key questions).
5. Work with the zonal representatives to complete a “working draft” of the zonal scorecard (this is helpful to orientate the advisor or facilitator prior to focus group discussions, but should not be used to lead focus group choices).
6. Carry out a first round of focus group discussions with primary stakeholders (there may be one or more focus groups per zone, depending on the level of socio-economic homogeneity) for the initial demand assessment and baseline survey.
7. Carry out a transect walk to conduct a limited household survey (using the same set of questions from the zonal scorecard) to cross check focus group results.
8. Collate information from focus groups and the household survey, and propose immediate and longer term interventions (or revise existing plans as needed).

Second consultation
9. Carry out a second round of focus group discussions in order to cross-check proposed interventions against consumers’ willingness and ability to pay.
10. Adjust plans as required based on stakeholder feedback.
12. Carry out a joint stakeholder meeting to review the action plan (proposed interventions agreed by zonal focus groups).

The following points are worth noting:

- Module 1.1 provides a methodological approach to application of Step 1 modules 1.2, 1.3, 1.4 and 1.5 on assessment of institutional arrangements, and understanding the utility and the market. The results lead to preparation of the Initial Assessment Report and Action Plan for Step 2.
- The approach can be applied zone by zone, limiting the amount of work required at any one time.
- The baseline information should be reviewed at the end of the business planning time frame (5 years) for the purposes of an impact assessment.
- In Module 3.3 on monitoring and evaluation, the same method for consulting primary stakeholders is adopted but the zonal scorecard is expanded to consider operational performance and impact on consumers rather than demand assessments and baseline information.
- Module 3.3 also presents an approach for monitoring project progress (milestones and outputs), which are important for reform and performance based financing.
What types of stakeholders should you consider?

*Primary stakeholders* – households, businesses and institutions, e.g. schools, medical clinics; ensure that minority groups are represented.

*Secondary stakeholders* – town administrators (who have a local regulatory function) and water department or corporate oversight body representatives as well as operational staff.

What is consultation?

“Consultation” involves more than providing information about what is going to happen but does not give as much power to stakeholders, particularly primary stakeholders, as participatory approaches involving active citizen collaboration and citizen control. For further information on approaches to participation and when and with whom it might be appropriate to use them, see Box 1.1.1.

Interventions in town water supply and sanitation will normally be limited to consultation, since the choices that can be offered to those stakeholders are limited. However, corporate oversight body members should be encouraged to take an active role in developing ideas and taking and implementing decisions.
Participatory approaches can be classified in terms of the degree to which the people who participate can influence outcomes (Arnstein 1969). One recent example of this approach identifies five levels of participation, ranging from providing information through consultation, ‘deciding together’ and ‘acting together’ to ‘supporting local initiatives’. Providing information and consultation are only appropriate for initiatives started by government or a service provider while supporting local initiatives clearly applies to cases in which action has been initiated by community groups and other local stakeholders. Deciding together and acting together might be appropriate for initiatives started either by service providers or service users.

The crucial difference between providing information and consulting is that the latter provides more scope for consulted stakeholders to influence decisions. Providing information is a take it or leave it approach whereas consultation allows service users to give their views and service providers to tailor their plans to take account of their views. Consultation is likely to be appropriate when it is possible and desirable to give stakeholders some choices but not the opportunity to develop their own ideas or to participate in putting plans into action. In general, this will be the case when the choices that are practically available to them are limited.

Deciding together gives stakeholders a more proactive role in that they are encouraged to develop ideas, which provide input to the development of options, and to actively participate in the choice between those options. This requires more skill on the part of facilitators and may take more time but should create a greater sense of stakeholder ownership. Acting together goes one step further in that stakeholders are involved not only in making decisions but also in acting on those decisions.

Supporting local initiatives means helping local stakeholders to develop and implement their own plans. Those providing the support can of course put limits on what they will and will not support.

Why consult on water supply and sanitation service improvements?

Specific requirements relating to the business planning approach are:

- To improve understanding of the business planning process, and the stepped approach for incremental improvement based on reform- and performance-based financing;
- To ensure that proposals are those that consumers want and will pay for;
- To ensure that all stakeholders are clear about their roles and responsibilities in the Business Planning process including monitoring and evaluation (see Module 3.3).

How can you organise consultation?

The basic method advocated in this module (as described above) is to identify service zones within the town, and work with zonal representatives and focus groups to prepare a simple zonal scorecard. This is supplemented by a limited household survey. However, where appropriate, this can be further supplemented with informal discussions, private meetings, shared transect walks, public meetings, interviews with key stakeholders, and workshops.

- Informal discussions with individuals and small groups. These will often be useful to introduce ideas and obtain an initial understanding of stakeholder concerns.
- Private meetings, which can be used to introduce the consultation process, explain points and obtain feedback from meeting participants. Private meetings should normally be held with key town leaders at the beginning of the planning process in order to gain their support. Later, it may also be appropriate to explain your findings and conclusions to these key stakeholders before presenting them to the public at large.
• **Shared transect walks**, during which outsiders and insiders (community members and perhaps workers) walk through an area together and identify issues relating to water supply and sanitation.

• **Public meetings.** These can be used to explain proposals and present findings to a wider audience.

• **Interviews with key stakeholders**, for instance senior officials and politicians, specialist workers and community representatives. They will normally be used to explore relevant aspects of the interviewee’s knowledge, views and concerns.

• **Workshops**, which may be a better option than public meetings for obtaining detailed feedback on stakeholder views.

### 1.1.3 THE CONSULTATION PROCESS IN DETAIL

Further details on the consultation process are given below, and tied into the steps of the business planning process (as set out in the main Guidance Manual). The main focus is on Step 1 of the business planning process (the application of modules 1.2, 1.3, 1.4 and 1.5 leading to preparation of the Initial Assessment Report and Action Plan for Step 2).

**STEP 1**

The consultation process is shown in Figure 1.1.2 above, which assumes formation of an autonomous corporate oversight body, such as a town Water Board. This shows four stages to the consultation: preparation, initial meeting, initial consultation, and second consultation. These are supplemented by secondary meetings / surveys where appropriate. Figure 1.1.2 also shows the main objectives of the consultation process.

**1. Preparation**

Advisors and others with responsibility for undertaking or managing the consultation process should start by collecting all available secondary information in order to make sure that they understand the municipal context and any constraints to be considered/explained during the consultation process. In particular, any existing maps of the town showing administrative units (wards) and the existing water system should be collected. The information required from this exercise is shown in Box 1.1.2.

**Box 1.1.2 Information required on the town**

- Location and demographic Information
- Name of town
- Location of town
- Administrative status of town
- Distance to all weather road
- Distance to regional capital
- Institutions and businesses in town
- Population of town
- Number of households in town

Existing maps showing administrative unit and the water system should also be collected.
2. Initial meeting with town leaders

The town advisors should contact the town administration and its corporate oversight body (if already established), to discuss the programme and its implementation processes and ask for their support. An important part of this will be discussion about possible formation or strengthening of the corporate oversight body, e.g. Water Board. At this meeting the administration and the corporate oversight body may also:

- Identify key people who will be able to contribute to TWSS planning.
- Outline what they regard as the key problems and issues.
- Advise on demarcation of service zones within the town.

3. Initial consultation (focus group discussions)

The advisor together with the key people contributing to the TWSS planning should first carry out a physical inspection of the water system, and then finalize boundaries of service zones and identify a key representative for each service zone (the zonal representative). They should then work with the zonal representatives to fill in a draft zonal scorecard, and carry out the necessary preparations for the focus group discussions. The exercise of preparing a draft zonal scorecard will help to orientate the advisor / facilitator prior to the focus group discussions, but should not be used to influence feedback.

Meetings with the Corporate Oversight Body / Water Board

If the corporate oversight body has not yet been formed, then it will normally be appropriate to consult with stakeholders on the composition of the corporate oversight body, e.g. a Water Board. It may be that some stakeholders have very clear, well argued reasons for suggesting that one or more specific people should be on the Board. If consultation leads to the selection of active and committed Board members, it will greatly increase the possibility that the whole business planning process will be effective. If the Board has already been formed then this is an appropriate time to check on its composition and performance.

Meetings / surveys to gather information and define service zones

The advisors should organize additional meetings as required, for example:

- Consultation with senior politicians and administrators will help assess whether there is commitment to change and improvement, and what is and is not likely to be possible in relation to management and oversight arrangements.
- Consultation with system managers and operators will help to understand how systems function.
- Consultation with workers in the finance section of the utility operator will help to understand how financial systems work and any deficiencies in current financial procedures.
- Workshops with key informants can be used to explore important issues, such as demand, tariff levels and the approach to sanitation provision, with people from the public, private and civil society sectors.

(Reference is made here to Modules 1.2, 1.3, 1.4 and 1.5 which provide detailed guidance on the assessment of institutional arrangements, and understanding the utility and the market).

Focus group discussions

Focus group discussions should include all key consumer categories: households, businesses, and institutions (e.g. schools, medical clinics). It should also include minority groups, including women and socio-economically disadvantaged groups. There may be one or more focus groups within each zone, depending on the socio-economic profile of the
zone. Within each focus group, the advisor / facilitator will introduce the reasons for the TWSS programme, the business planning and “stepped” approach, and the role and responsibility of each stakeholder. The zonal scorecard (water user survey) would then be presented for discussion and completion.

The focus group discussions (and follow up household survey) should establish the following:

- Information on existing services
- Customer perceptions of existing services
- Demand for improved services (and the level of service)
- An indication of how much consumers will pay for improved services
- Identification of priority interventions and longer term plans for expansion

### Box 1.1.3: Data required from zonal scorecards and household surveys

**Water Supply Information**
- Water source 1 (spring, well, or surface source), (piped or point distribution), (protected or unprotected)
- Water source 2
- Water source 3
- Percent of households (0-25%, 25-50%, 50-75%, 75-100%) using water source 1, 2 and 3 for:
  - Drinking and cooking
  - Bathing
  - Clothes washing
- Distance to sources 1, 2 and 3 (meters)
- Time it takes to collect 20 liters of water (make one round trip) for sources 1, 2 and 3 (minutes)
- Condition of water supply facilities (good/fair/bad) for sources 1, 2 and 3
- Quality of water (good/fair/bad) at sources 1, 2 and 3
- Reliability of supply (good/fair/bad) at sources 1, 2 and 3
- Accessibility to water (good/fair/bad) at sources 1, 2 and 3

**Demand for improved services**
- Need for and location of public kiosks
- Percent of households that want a connection, and how much/how/when they can pay:
  - Individual
  - Shared yard tap
- Identification of businesses that want a connection, and how much/how/when they can pay
- Identification of institutions that want a connection, and how much/how/when they can pay

**Sanitation Information**
- Length of the sewer system (km)
- Number of sewer connections
- Type of treatment
- Volume of wastewater collected (m3)
- Percent of households (0-25%, 25-50%, 50-75%, 75-100%) with latrines
The household survey can be limited in scope, since the objective is to verify the results of the zonal scorecard. For example, in a zone with 400 households, a survey of 20 households should be sufficient to confirm the results of the focus group discussions. If the results are ambiguous, or detailed information is needed for project appraisal purposes, then a more rigorous survey can be proposed.

The household survey should include the same questions used in the focus group discussion (Box 1.1.3): sources; distances; time to collect; condition of facilities; quality; reliability of supply, accessibility, and demand for improved services. When carrying out the survey, the group should be as small as possible, for example it might include the person filling in the survey, the advisor, the system manager, a member of the corporate oversight body, and the zonal representative, as well as one or two key participants from the focus groups.

The information gathered provides the basis for designing **system improvements and expansions**. It should therefore provide details on the need for and location of public kiosks and approximate numbers and types of connection that consumers want. At the time of detailed planning, it may be possible to secure connection agreements with an upfront payment to reduce uncertainty about future use of the system.

**Second consultation, and preparation of the action plan for step 2**
In between the two rounds of focus group discussions, the advisor will collate information from different focus group discussions and prepare a draft assessment report and a draft action plan with recommendations for immediate and longer term interventions and specific plans for each zone.

The aims of the second round of focus group discussions should be to:

- Ensure that the various stakeholders understand the baseline assessment findings, the immediate service improvement plan and the longer-term proposals, especially regarding their own service zone.
- Agree on any changes that need to be made in the draft assessment report or the action plan to take account of legitimate stakeholder concerns.

A final joint stakeholders meeting can be held at which the planning advisors present a summary of the assessment report conclusions and recommendations and the action plan components. Ample time should be allowed for questions and discussion.

**STEP 2 AND BEYOND**
In step 2 the emphasis shifts from the initial demand assessment and baseline survey, to M&E for operational performance including customer satisfaction. The main sources of information are:

- Application of the zonal scorecard to assess impact on consumers (see Module 3.3)
- The operators reporting requirements (see Module 3.1, annex 2)

In addition to M&E for operational performance, there is a need to monitor project progress (project milestones and outputs) particularly where these are needed as triggers for reform and performance based financing (see Module 3.3).
1.2. Assessing Institutional Arrangements

The purpose of this module is to provide guidance for assessing existing institutional arrangements at town level. On this basis, consultants/advisors working with town representatives should be able to assess existing skills, organisational performance and the need for institutional reform at town level. The results from the analysis based on this module feed into the Initial Assessment Report.

Module content
- Objectives of the institutional assessment
- Assessing institutional arrangements at town level – an annotated checklist

What are the objectives of the institutional assessment at town level?

An important component of the Initial Assessment Report to be prepared by towns (and their consultants/advisors) in Step 1 consists of assessing existing institutional arrangements to identify existing skills, organisational performance and the need for reform. The objectives of such an institutional assessment include:

- To evaluate whether the town has adequate capacities to supervise the development of its water services;
- To evaluate the gap in capacities and the need for professional support;
- To evaluate the need for institutional changes at town level in order to:
  - Allocate certain functions to separate entities if combining them within a single institution may lead to conflicts of interest;
  - Bolster certain functions if they are inadequately carried out at present.

On the basis of this assessment, the consultant/advisor working with the town should be in a position to recommend institutional changes to increase the chances for improved service provision. In practice, institutional reform can come about in two ways. It may be part of a government reform programme with clear policy objectives and reform- or performance-based financing. Or it may be the town / municipal council’s own initiative to establish a programme of incremental improvement. This second approach might also come about under the conditions of a government supported pilot study. The present guidance for institutional assessment would be of use in both cases.

Recommended institutional changes should reflect the following principles:

- Clarify the allocation of responsibilities between institutions;
- If there is a risk of conflict of interest because an institution is carrying out several functions at once, e.g. regulation, oversight and service provision, and seek to shift some of its functions to other institutions, and introduce a system of checks and balances or external arbiters;
- If the capacity for carrying out those functions at town level is deemed to be too low, identify sources of professional support to help them carry out such functions (in this module such professional support could refer to support provided to either regulatory, corporate oversight or operational functions, which are discussed in detail in modules 1.3 and 1.4 on technical and financial aspects).
How can institutional arrangements be assessed at town level? A checklist

The allocation of functions between town level institutions may vary substantially from one town to another (see Module 0.2. for a presentation of those functions). The consultants/advisors are therefore encouraged to proceed as follows:

- Identify which institutions are supposed to perform water sector functions in the town;
- Seek answers to the following questions:
  - Who is responsible to carry out which function?
  - Do they do it in practice?
  - What tools do they use to carry out the function?
  - What are their strengths and weaknesses for carrying out the function?
  - What support do they get from external entities?
  - What challenges do they face and what could be done to support them?

The following is presented as a guide or checklist for carrying out this assessment. Text in italics provides guidance on how to interpret answers to the questions raised. Based on this assessment, the consultants/advisors should be in a position to identify problem areas or potential conflicts of interest and to recommend improvements. (The problems and solutions that a town identifies as critical are carried forward to Module 1.6 on prioritizing interventions).

1.2.1 IDENTIFY INSTITUTIONS PERFORMING WATER SECTOR FUNCTIONS IN THE TOWN

The first step is to prepare a matrix along the lines of Table 1.2.1 below, which reflects the allocation of water functions in the town under review. Possible institutions in charge of such functions are also presented. However, this situation may vary from country to country and depend on the management model.

Table 1.2.1 – Allocation of water functions at town level: filling in a matrix

<table>
<thead>
<tr>
<th>Function</th>
<th>Institution responsible at town level</th>
<th>Supporting organization?</th>
</tr>
</thead>
</table>
| Service provision | • Water Association staff  
• Municipal employees  
• Town water operating staff  
• Local private operator | • Consultants, advisors, engineers  
• NGOs  
• Ministry services (government institutions) |
| Corporate oversight | • Members assembly (in the case of an association)  
• Water Committee within the Municipal Council  
• Town Water Board | • Consultants, Advisors  
• NGOs  
• Ministry services (government institutions) |
| Regulation      | • Municipal Council or Water Committee  
• Specially set up contract monitoring unit (if contract) | • National level regulator  
• Users association (for quality monitoring and reporting)  
• Consultancies (tariff studies, WTP surveys, etc) |
| Asset-holding   | • Municipality, public asset-holding company or Ministry | • Consultancies (investment planning, asset registries, etc) |
1.2.2. Analyze how each function is being performed

What follows is a checklist that should help you carry out the institutional assessment at town level. The level of complexity of the questionnaire should be adapted to the circumstances of the town. If during the initial “mapping out” exercise, you found that a single institution or person is in charge of several functions, you should then ask them questions corresponding to all of those functions at the same time. In many small towns, there may be some confusion about the delegation of responsibilities, and the same individuals or group of individuals will likely be in charge of various functions; you will need to understand whether they are aware of those different functions and, if they are “wearing several hats”, whether they are trying to carry those functions out in different ways (in terms of who they report to for example).

If you find that nobody is in charge of carrying out this function, or there is extreme ambiguity about the allocation of such responsibility, it is very important that you note this as a gap. These are the areas for potential improvement which need to be highlighted by the analysis, and in formulating recommendations on reforming the institutional arrangements. When doing so, you should always bear in mind the costs of establishing new institutions or of carrying out certain functions adequately: if the impact on final service from a function not being performed is insignificant (both in the short-term and in the long-term), the current arrangements may well be optimal. But if this condition does not hold, reform proposals should be formulated that fit in the overall context of national policies. (Note that this level of analysis will be refined in applying module 1.6 on prioritizing interventions, so that a long list of problems and solutions can be drawn up at this stage).

### A. Service provision functions

- **Who is responsible?**
  - What are the existing arrangements for operating the system? Who is it in charge of commercial management, financial accounts, routine operation and maintenance, efficiency improvements, and expansion? (*select the appropriate options*)
  - How is the utility organised?
    - Obtain an organisation chart
    - Get data on staff numbers (managers, professional staff, non-professional workers), positions, qualifications, experience and skills
  - Who employs the staff: e.g. an association or water board, the municipality, or another local body?

- **Do they actually carry out their delegated functions? What tools do they use to carry out such functions?**
Answers to these two questions would need to be obtained in detail when reviewing the current operations of the utility, as per the guidance provided in the “Understand the utility” modules. For each operational function identified in Module 0.2. (Principles for analysing town-level water functions) and further developed in Module 0.3. (Principles for cost-effective design and operations), the consultant/advisor should analyse whether this function is adequately performed and whether additional professional support may be required. The consultant/advisor should pay particular attention to existing procedures in place, to examine whether the utility operations managers have the right degree of autonomy to perform their functions efficiently.

- **What are their strengths and weaknesses for carrying out such function?**
  - Estimate indicators of staff efficiency: number of staff per connections, staff turnover (average number of years that each staff has stayed on)
  - What is the ratio between qualified professional staff (e.g. an electrical engineer, an accountant, a plumber) and unqualified workers (e.g. pump operators, security guards)?

- **What support do they get from external entities?**
  - Have they carried out any training activities? Is there ongoing training to build skills?
  - Who provided/provides such training: was/is it on-site or off-site training?
  - How much is spent on training in an average year?

- **What challenges do they face and what could be done to support them?**
  - What skills are currently missing in the organisation? What specific problems are facing the organisation?
  - Why? Possible reasons would include: “no position”, “recent resignation”, a position exists but unfilled” because of “budget restrictions” or “lack of capacity at town level” or “no access to external support”
  - If a skill shortage is observed, what is currently being done to address skill shortages?
  - What are the general feelings regarding “building capacity” or “buying capacity”, i.e. outsourcing functions?

**Key problems in service provision** that can arise include:
- Lack of professional staff;
- Ambiguity in task allocation;
- Lack of incentives to perform.

**Potential solutions** may include:
- The introduction of performance-based contracts (either internal or external);
- Ongoing training;
- Outsourcing, professional support and aggregation.

### B. Corporate oversight functions

- **Who is responsible?**
  - Who is in charge of appointing the water utility operations manager and supervising him/her?
  - Who is in charge of guiding the utility’s budget and its investment program?
  - Who is responsible for guiding the business planning process?
  - Who is in charge of hiring and firing personnel?

- **Do they do it in practice?**
o What is the legal basis for the corporate oversight body? What is the nature of its relationship to government?

o When was the corporate oversight structure formed? What is the origin of Members?

o What decisions have been taken so far?

o What has been the degree of scrutiny of the authority’s activities?

o Has a utility strategy or business plan been prepared and is it used to hold the utility operations manager to account on its performance? If it exists, has the business plan been regularly adjusted?

**What tools do they use to carry out such function?**

- Does the utility operations manager submit management accounts to the corporate oversight structure to report on the utility’s performance?
- What kind of financial accounting / reporting is carried out?

**What are their strengths and weaknesses for carrying out such functions?**

- Do Board members have adequate capacity? What is their background and experience at carrying out corporate oversight functions?

**What support do they get from external entities?**

- Have the members of the corporate oversight structure received any training?
- Have they ever contracted external consultants/advisors to help them with some tasks?
- Do they have experience in working with private contractors?

**What challenges do they face and what could be done to support them?**

- Would the corporate oversight structure be equipped to monitor a contract with an external operator? How would it need to be reinforced to do so?
- Would the corporate oversight structure have the capacity to review a business plan if asked? Who could they turn to for support in that case?
- Is the corporate oversight structure autonomous or reliant on decisions from the municipality or other political bodies?

**Key problems in corporate oversight** that can arise include:

- Lack of autonomy in management and investment decision making;
- Instability of the corporate oversight body;
- Ambiguity of reporting duties;
- Lack of incentives to perform.

**Potential solutions** may include:

- Ensuring a sound legal basis including specification of responsibilities, separation of regulation from corporate oversight, and the authority to implement performance contracts;
- Establishing the business planning approach with monitoring and evaluation framework and reporting mechanisms.

**C. Regulation functions at town level**

An important tool for monitoring service provision is the contract and M&E framework set out in modules 3.1 and 3.3. However, “regulation” has broader meaning than monitoring, and some of the key points are discussed below, in particular relating to economic, environmental and public health issues. In considering regulation, it is critical that a realistic assessment is made of what is needed and can work at town level.

**Who is responsible?**

*Economic regulation*
Who is in charge of setting tariffs for the main water utility? Is there a clear procedure for updating tariffs and which local stakeholders does that procedure involve?

Are there tariff-setting principles that the entity in charge of setting tariffs is supposed to follow? Are they well defined? Where are they defined: in the law or in a local-level contract with an operator?

Does anyone supervise tariffs charged by small-scale providers (such as standpipe attendants, water carriers or water resellers)?

Who is in charge of setting customer service standards and monitoring their enforcement?

Who is in charge of supervising the letting of contracts?

Who is in charge of resolving customer complaints if they have not been resolved by the service providers themselves?

Environmental regulation

Who is in charge of monitoring whether environmental standards are complied with?

Who is in charge of monitoring abstractions at the local level?

Who monitors wastewater quality and discharge? Is there a mechanism to assess the impact of expanding water supply on increased wastewater?

Public health or drinking water regulation

Who is in charge of monitoring whether drinking water standards are complied with?

Do they do it in practice?

Economic regulation

Are tariffs for the main water utility close to costs, including operating costs, financial costs, depreciation and a return on investment? What portion of total costs do revenues cover?

Have tariffs been adjusted in recent years? When were they adjusted for the last time? Were such tariff adjustments based on pre-agreed principles?

Are tariffs for small scale providers regulated in some way?

Does service quality meet required standards? Have they identified any service deficiency and asked the service provider to take remedial measures?

Have any tendering processes for operating contracts been organised? Were they competitive? Were they supervised at the local level?

If customers have complaints about tariffs or service quality, are these complaints heard and dealt upon? (see also Module 1.5 on understanding the market including the water user survey for further information on customers)

Have any sanctions been applied to service providers for inadequate service provision?

Environmental regulation

Does the entity (ies) in charge of monitoring do it in practice? If they observe a fault, would they report it to a higher level of government?

Have they applied any sanctions to offenders?

Public health or drinking water regulation

Does the entity (ies) in charge of monitoring do it in practice?

What tests are performed and how often? Where on the system is water tested?

If they observe a fault, would they report it to a higher level of government?

Have they applied any sanction to offenders?

What tools do they use to carry out such functions?
o Does the entity (ies) in charge of such functions receive regular information about the service, including tariffs charged, revenues, service efficiency and quality of service?

o What service indicators do they track on a regular basis? How is the information collected, transmitted and verified? Does the entity receiving this information have the ability to compare the water utility’s performance (in terms of tariffs and quality) to that of other utilities in the country? Do they use such comparisons to ask for service improvements?

o If tariffs are relatively high compared to other towns in the country, do they have any way to analyze why tariffs are high? Is it because the utility is covering a higher proportion of its costs, or because the costs are higher due to uncontrollable factors (such as poor quality raw water) or for factors internal to the utility (high staff costs)?

o For setting tariffs, do they use a spreadsheet model? What is included in this model: are there any glaring omissions? How sophisticated is the model?

→ Indications of what should be incorporated in a simple financial model at town level are provided in Module 1.6 on conducting a financial assessment.

→ Indications of the type of indicators that are useful to track at town level are contained in Module 3.3 on monitoring and evaluation. If no information is currently collected, it would be a strong indication that the ongoing level of regulation is very limited.

• What are their strengths and weaknesses for carrying out such function?
  o Do the persons in charge of regulation (economic, environmental and public health) understand their functions?
  o Do they have sufficient technical and managerial capacities for carrying out such functions?

• What support do they get from external entities?
  o Have they carried out those activities by themselves or obtained support from an external entity, such as a national regulator (if it exists)?
  o What kind of external support have they received?
  o Do they get information on the tariffs and service quality in other towns to which they could compare the situation in their town?

• What challenges do they face and what could be done to support them?
  o Have discussions around tariffs been affected by political intervention?

At town level, tariff setting is often the responsibility of the Mayor or Municipal Chairperson, with no distinction between the policy-making, asset-ownership and regulation functions. This may lead to a situation where political motives rather than economic or technical rationale drive tariff decisions. The consultant/advisor should examine whether this has been a problem in the past, by comparing the timing and scope of tariff decisions with the calendar of past elections.

  o What are the problems at town level that may be due to a lack of regulatory oversight, such as relatively high tariffs (if compared to production costs or if compared to the situation in other towns) or poor service quality (high levels of unaccounted-for-water, long delays for mending leaks or for establishing a new connection, etc…)

Key problems in regulation that can arise include:
• Lack of capacity to implement required regulatory functions;
• Weak application of tariff-setting and contracting processes;
• No mechanisms to identify or address customer complaints;
• Indifference to environmental sanitation;
• Poor practice of water quality monitoring;
• Inability to apply sanctions.

Potential Solutions may include:
• Ongoing training;
• Application of business planning principles in linking strategic objectives to tariff setting;
• Standardised approaches to contracting;
• Close monitoring of performance including impact on customers;
• Use of community scorecards and other mechanisms to maintain a customer focus;
  Government support in understanding environmental standards, and for ongoing education programmes relating to health and hygiene;
• Standardised approaches to monitoring water quality;
• Establishing clear lines of communication with customers (such as community scorecards).

D. Asset holding functions

• **Who is responsible?**
  o Who is nominally the owner of the assets?
  o If assets were previously owned by the central or regional government, have they been officially transferred to the town? Did the transfer require any financial transfer?
  o Are there matching liabilities? Who is in charge of repaying the debt? What budget does debt repayments come out of?
  o Who is in charge of planning and carrying out long-term investments, including maintenance of the assets and asset expansion?
  o What is the nature of financial assistance from government? What are the conditions? How often are funds available?

• **Do they do it in practice?**
  o Have any significant investments taken place in recent years in the town? Who was in charge of planning and carrying out such investments?
  o How was such investment programme financed: were they debts associated with it?
  o Have they ever let a contract with an operator for operating those assets? If so, who was in charge of preparing the contract? Was a competitive bidding process organized?

• **What tools do they use to carry out such functions?**
  o Is there an asset registry? Is it reasonably well-kept or are there gaps?
  o How reliable are the asset values as inscribed in the asset registry?

• **What are their strengths and weaknesses for carrying out such function?**
  o Do the persons in charge of planning and carrying out investments understand their functions?
  o Do they have sufficient technical and managerial capacities for carrying out such functions?

• **What support do they get from external entities?**
  o Have they carried out those activities by themselves or obtained support from an external entity, such as a construction consultant/advisor?

• **What challenges do they face and what could be done to support them?**
o Does the town need to plan and carry out a substantial investment programme in the coming months / years?
o Will the town need to obtain external financing for such an investment programme?
o Are there enough capacities at town level to manage such a programme?
o Is there any plan to let a contract to a private operator for managing those assets?
o If that is envisaged, is it clear at present who would be responsible for letting such a contract?
o If there is not enough capacity at town level to carry out those functions, where can they obtain support at present? Could they obtain more support from such source?

It is generally the case that the entity in charge of letting a contract to a private operator is also the one that owns the assets. However, this responsibility may be blurred by a number of factors: in some cases, the transfer of assets has not taken place, or at least, not in a transparent manner so the issue of asset ownership is not settled. In other cases, the municipality owns the assets but there is no trust at the level of the central government that they would be able to let a contract for operating those assets. In such case, the bidding process would be organised by a higher level of government.

Key problems in asset holding that can arise include:
- Ambiguity of ownership which can discourage investment;
- Transfer of assets is accompanied by transfer of financial liabilities;
- Ambiguity in future financial assistance from government;
- Poor inventory of assets.

Potential solutions may include:
- Ensuring a legal basis for ownership or some mechanisms to ensure a fair rate of return on investments;
- Ensuring appropriate design and linking design and financial viability before transfer of assets (in the longer term);
- Improved record keeping;
- Establishing government reform- and performance-based financing to support programmes of incremental improvement.

E. Local level policy making functions

- **Who is responsible for:**
  o Setting water and sanitation service coverage targets for the town as a whole
  o Determining which geographical zones should be covered in which order of priority, depending on the urban planning framework for the town as a whole
  o Setting objectives for water service quality targets, in terms of accessibility, reliability, continuity at the local level
  o Identifying which consumers should be subsidised if there is any policy in place for targeting poor customers specifically

  *If the answers to the above questions all lead to the same institution, the following questions should be focused on evaluating that institution’s ability to carry out its functions. If these functions are spread out, a similar exercise will need to be carried out with separate institutions.*

- **Do they do it in practice?**
  o Have priority service areas (geographical zones) for expanding coverage been defined?
  o Have minimum service levels for the town been prescribed? Have they done so on the basis of national-level guidance or from their own initiative? *For example, certain
local authorities would choose to ban standpipes or other forms of public supply, although this would not always be done in coordination with the service providers, which means that it is either not enforced or that customers would be deprived of important service options.

- Do they know where poor customers are located (throughout the town or at the periphery, in specific pockets of poverty)? Has any method for targeting poor customers specifically been defined?

**What tools do they use to carry out such function?**

- Does the institution in charge of policy making have maps of the town where they can cross the information relative to the water service network, the quality of urban development and localisation of poverty? Can they do this at least in broad terms?
- Has the town as a whole prepared a Town development plan or strategy, outlining the challenges it is currently facing and where they want to get to? Are they supposed to prepare such a plan in the near future to fulfil regulatory requirements?

If the answers to the above questions are no, then we can fairly assume that policy-setting is not carried out at the town level but that town officials would tend to follow broad policy objectives set at national level.

Policy-setting functions are seldom explicit at town level so it is unlikely that they would be effectively performed except if there are certain projects and programmes that call for a policy intervention (such as the introduction of an Output-Based Aid scheme for example, requiring the municipality to draw up lists of poor people eligible for direct connection subsidy, as was done in Cambodia for example).

**What are their strengths and weaknesses for carrying out such function?**

- Do the persons responsible for policy-making understand their functions?
- Do they have adequate capacity to fulfil their functions (in terms of staff number and capacities)?
- If they are not currently performing their functions, do they have a clear plan for developing policies for local water services, which is integrated with development policies for the town as a whole?
- How participative has the process of policy-making been? Do they hold public hearings to hear the views of the public on the determination of the town’s policy objectives?

**What support do they get from external entities?**

- Do they get any support from a higher level of government or support organizations (including consultants/advisors) for carrying out their town planning functions overall?
- Has any financial assistance been provided for the preparation of a town development plan?

**What challenges do they face and what could be done to support them?**

- Is the town growing rapidly or shrinking, in terms of number of people but also economics? What kind of policy challenges does that raise?
- In the view of the policy-makers, what are the most critical issues for water supply: expanding coverage, improving service quality (in particular, pressure or continuity) or changing tariffs?
- If there is not enough capacity at town level to carry out those functions, where could they obtain support at present? Could they obtain more support from such source?

Problems in local level policy making that can arise include:

- Lack of special information (e.g. maps of the water system and service zones);
• Inability to balance competing needs (e.g. water resources, utility financial viability, social needs);
• Inappropriate service standards (e.g. setting unrealistic levels of consumption on which to base source requirements);
• Inability to identify service zones and provide equitable services.

**Potential solutions** may include:
• Improved information data bases, including maps;
• Application of business planning principles including prioritising interventions and financial modelling;
• Use of water user surveys to rationalise service standards based on willingness and ability to pay;
• Identification of service zones and investment in infrastructure to ensure equitable distribution.

### 1.2.3. IDENTIFY PROBLEM AREAS AND RECOMMEND SOLUTIONS

The results of this analysis will be a key input into the Initial Assessment Report, to be prepared at the end of Step 1. Those results will feed into Section 1.2 where the consultant/advisor should summarise their assessment of the current institutional arrangements for policy-making, asset-holding, regulation and corporate oversight.

One way of summarising the institutional assessment would be to prepare a figure showing the allocation of functions between main stakeholders at town level, similar to the figure presented in Module 0.2. on town water sector functions.

Such a figure can be a useful tool for generating discussions on potential reforms between stakeholders. The figure can then be used to try and identify how the functions are combined (i.e. when a single institution, as represented by circles, may be in charge of several functions) and whether this can generate any conflict of interest. If a single institution (such as the Municipal Council) is in charge of delivering several functions, the consultant/advisor working with the town, based on the previous analysis, will seek to identify possible conflicts of interest which could give grounds for separating such functions and recommending solutions.

In this module, some of the key problems and possible solutions have been identified. Broader institutional reforms are set out in Module 0.2., which outlines best practices for town water reform.

An important role of the institutional assessment in combination with the process of prioritizing interventions, is to help what kind of professional support is needed. This is developed further in Step 2 of the business planning process.
This module provides guidance to understanding existing water supply facilities, and evaluating technical operational performance. This requires collecting, ordering and analysing data before options for improvement can be explored, priorities decided and a service improvement plan produced. Baseline technical performance indicators are identified against which to judge future improvements. The data should be fed into and analysed in the Initial Assessment Report at the end of Step 1.

Module content
The module is structured around four stages:

- Understand the system and collect baseline information
- Analyse the information and identify deficiencies and needs (relating to system capacity, operational efficiency, and expansion)
- Identify options for meeting needs and dealing with deficiencies (including investments)
- Prioritize options and develop an action plan.

The material is structured in a way that allows the user to work their way through the system hierarchy, assessing deficiencies and resources and identifying the need and scope for action.

1.3.1 INTRODUCTION

All water supply systems need capital investment from time to time. The questions for water system managers are;

- What are our priorities for investment?
- When should we invest?

Answers to these questions require analysis and this analysis must be based on information. This module is concerned with the collection of relevant information and its use in assessing operational performance and determining investment priorities. The broad process described in the module is shown in Figure 1.3.1. Note the feedback loops, which indicate that the process is not linear. Activities at later stages in the process may give rise to questions that require that information collected and decisions made at earlier stages in the process are revisited.

The approach follows the principles for cost effective design set out in Module 0.4. It is concerned with operational efficiency, in the broad sense of ensuring that available funds are used in the most efficient way to improve existing services and extend services to currently unserved areas.

The remainder of this module is ordered in accordance with the process set out in Figure 1.3.1. Section 1.3.2 explains the way in which water supply systems are structured and each stage in the planning process is then considered in turn.

Figure 1.4.1 Planning for improved service provision
1.3.2 UNDERSTANDING THE SYSTEM

The starting point for analysing any water supply system is to understand the way in which it is structured. Water supply systems vary in size and complexity, but piped water supply systems consist of a series of linked components, which will always include some, but not necessarily all, of the following.

- **The source or sources**, which will normally be a spring, a surface water source or groundwater.
- **Intakes and production facilities**, including spring boxes, river intakes, water treatment works and tubewells.
- **Transmission facilities** - transmission mains that transfer water from remote intakes and centralised production facilities to service reservoirs serving local supply zones.
- **Service reservoirs** - from which water can be distributed to users by gravity.
- **Distribution systems**, each supplied by a service reservoir serving a particular zone and consisting of a network of pipes. (In many small towns, there may be only one or two zones)
- **Water outlets**, including domestic (individual house connections, individual yard taps, shared yard taps, public standpipes, and vendors) as well as commercial, industrial and institutional water connections.

These components are included in more or less hierarchical systems, with water produced, then transmitted and stored before being distributed to water outlets.

Areas outside the piped distribution system may be served in a number of ways, such as hand dug wells, boreholes fitted with handpumps, and surface sources such as ponds and streams. Where shallow groundwater is available, people may dig wells. The more common situation is that water is supplied by vendors, who may obtain water from standpipes or from natural water courses. It is important to understand where the people outside the area served by the distribution system obtain water as this may influence the amount of water that people purchase from the utility and the strategy for expansion.

1.3.3 COLLECTING AND ORDERING INFORMATION

Types of information

Information can take a number of forms. Assessment of the existing situation might require some or all of the four main types of information

- **Spatial information** - which indicates where things are. It is best recorded on maps and plans.
- **Quantitative information** – which provides information on numbers and/or percentages, for instance the number and percentage of households that have a water connection. This type of quantitative data will normally require analysis and manipulation of data sets. Quantitative data may also relate to the values of specific parameters – for instance the charges made for water. These do not require manipulation of data.
Qualitative information – which provides information about the quality of a process or service

Definitive information – the information that defines a particular facility or object. It will typically be presented in the form of a drawing or sketch that illustrates exactly how a facility has been or is to be built.

It is important to identify the type of information that you are dealing with in order to use appropriate methods to collect and present it. So, for example, information on the location of water mains is spatial and should be shown on a map. Information on the number of connections is quantitative but analysis will also normally require information on the location of connections.

Background information

Background information is required to put investigations of existing service provision and potential future demand into context. The types of background information and their potential uses are listed and briefly described below.

1. Demographic/household information. Information on overall population and/or number of households is required in order to estimate per-capita water production for the town population as a whole and, together with information on the number of connections/standposts and latrines, current and projected future water supply and sanitation coverage figures. These, in turn, will provide an indication of the maximum size of the market for water supply and sanitation services.

2. Spatial information on locations and types of development. This will be required when planning the future location of water storage facilities and distribution systems, drain and sewer systems and wastewater treatment facilities. Information might cover some or all of the following:
   - The locations of different types of development (high/low income residential, formal/informal, business and industrial areas etc.). To be used when assessing the type of water supply/sanitation systems to be used in different areas
   - Planned developments
   - Development trends – where the town is growing. The aim should eventually be to make some sort of estimate as to where the boundaries of the built-up area are likely to be in the future. If there is an existing realistic town development plan, its main proposals should be shown, together with information on what has and has not been implemented to date.

   This information should be shown on a scale plan if one is available. Failing this, it should be shown on a sketch plan. If possible, information on the location and boundaries of different development areas within the town should be accompanied by information on the estimated current and future populations of those areas.

3. Spatial information on physical features (rivers, topography, major roads and railways etc). Topography will have an important influence on the way in which water supply and drainage systems operate. Other physical features may constrain the options for future system extensions.

4. Information on administrative and political systems and subdivisions. At the level of the town as a whole, the need is for information on its administrative status, in particular whether or not it is a district headquarters. This may influence the way in
which water and sanitation services are being provided at present and the options for providing them in the future.

5 A brief review of the economic status of the town. This does not have to be detailed. Rather, the need is for a brief statement, establishing whether the town is likely to grow in the future and whether this growth is likely to lead to an increase in demand for water supply and sanitation services.

6 Information on the location of the town in relation to other towns. (Including the national capital and regional and district administrative centres). This information may be important when considering the options for aggregating responsibilities for oversight and/or utility operations management.

7 Information on any other plans developed by the town or by its technical consultants/advisors for water and sanitation services.

8 Any available information on water and sanitation-related diseases. Such information can be used to support the need for investment in water supply and, particularly, sanitation improvements. Do not spend too much time seeking information if accurate and reliable information is not readily available.

Understanding the structure of the system

The first step in assessing the existing system should be to prepare a plan showing the relationship of the various elements in the system. This will help you to understand how the system is structured and will provide a framework for subsequent information collection and analysis. The diagram should show the following:

- Present and potential future water sources
- Production facilities (tubewells, springs and water treatment works) and their assumed capacities
- Pumps and their rated capacities
- Any transmission mains
- All service reservoirs and holding tanks
- The main features of the distribution system (Including all mains of 4-6” diameter depending on the size of the system and above and any arrangements that have been made to zone the system.

It may also be useful to include something in the diagram on the arrangements for supplying water to areas that are not currently served by the piped distribution system. The diagram does not have to be to scale. Indeed, a simple diagram is often easier to understand than a scale plan and will help you to understand the way in which the various components of the system are connected. Later, proposed improvements can be shown on this diagram, which should be included in the feasibility report in order to provide an overview of the proposed system improvements. If a scale map base of the town is available, the diagram might be designed to roughly overlay it.

On the basis of this diagram, supported by information gained from field visits as required, try to identify supply zones. For each supply zone, the aim should be to identify the production facilities, transmission main(s) and service reservoir(s) that serve it and, if possible, determine the number of connections in the zone.
Information on system components

Sources

Information should be collected on present and potential future sources. The questions to ask at this stage are:

- What are the sources?
- Where are they?
- What, if anything is known about their yield?

Sources include groundwater, springs and surface sources (streams, rivers and lakes). The assessment should aim to ascertain whether or not existing and possible alternative sources will have sufficient capacity to meet the short term and longer term water needs of the town.

Some information on existing sources and their potential yield may already be available. Where good information is not available, it will be necessary to either make a judgement based on what is already known or commission detailed studies to obtain a more accurate assessment of yield.

Notes on springs, groundwater and surface sources are given below.

Springs

The yield of springs may vary through the year and the critical figure for water system design will always be the minimum yield, which will normally occur towards the end of the dry season. Where a spring is already being used, or at least considered, to supply the town, its yield may already have been measured. Even so, it will be advisable to measure the actual yield. Where some fall is available below the spring, this can be done using a simple rectangular or V notch weir, depending on the flow.

Note whether the spring has been improved in the past. Where this is the case, it may be difficult to increase its yield by further development. Also, assess whether there is any possibility of combining the flows from a number of springs into a single catchment system. When considering such possibilities, it may be advisable to take specialist advice from someone who has practical experience of spring improvement projects.

Groundwater

Information may be available on the capacity of existing borewells. Such information is strictly about production/abstraction capacity rather than the potential yield of the aquifer. Nevertheless, it does provide some indication of how much water is likely to be available from an aquifer. However, it will normally be advisable to take hydro-geological advice on the yield of aquifers, particularly if the aquifer is not continuous so that there are large variations in yield between existing wells. Water quality will need to be tested for chemical, e.g. arsenic and fluoride, and biological contamination. Particular care is needed in agricultural areas where pesticides or fertilizers are being used.

Surface water sources

The minimum flow in rivers and canals will often be significantly greater than the quantity of water abstracted. There may be limits on the amount of water that the water utility is allowed to abstract and information on this should be sought in order to establish whether or not it will be a constraint. However, there may also be cases in which the flow in the watercourse is limiting, particularly when the watercourse is small.

If water is being extracted from an irrigation canal, be aware that there may be periods when the canal is closed for maintenance work. Water demand during these periods will have to be met either from other sources or by providing sufficient storage to allow supply to be continued during the period of canal closure.

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1 Many canal-fed schemes in India include large storage reservoirs known as summer storage tanks. These are filled in the period prior to the canal closure and are then used over the period of the closure. The rate of extraction from the canal has to be sufficient to both meet ongoing demands and
Production facilities

Production facilities include the pumped borewells that exploit groundwater resources, improved springs and treatment works for water drawn from surface sources.

**Spring intakes** Normally, the production capacity of spring intakes will be equal or close to their yield. There may, however, be cases in which some of the spring capacity has to be reserved for other purposes – perhaps to serve local communities or to ensure a minimum flow in a downstream watercourse. Allowance for such uses must be made when assessing the production capacity of a spring source.

**Borewells and tubewells** Information on the rated capacity of existing borewells/tubewells will often be available. Do not assume, however, that the actual capacity of a borewell or tubewell is the same as its rated yield. Output will tend to reduce over time, perhaps because the pump’s output reduces but also because the level of the water table has dropped and/or there are problems with the well filter screens. So, it will be important to measure the actual capacity of the well. Where there is a functioning meter on the discharge from the well, the capacity can be obtained from analysis of meter readings. Where there is no meter, flows will have to be assessed in order to estimate capacity. Information on how this might be done is given in the accompanying technical notes (Module 1.3b).

Where flow measurements show that actual capacity of a well is significantly lower than its rated capacity, possible reasons should be investigated. Reduction in yield over time is likely to be particularly significant where no gravel pack has been provided around the filter screens. You should also check the condition of the borewell pump.

**Surface water sources** Water from surface water sources will normally be pumped. Look at the arrangement of the pumps. If possible, measure the actual output of each intake pump in turn, using bulk meter readings where these are available or the flow into a holding or waterworks sedimentation tank. If information on the rated pump capacity is available, perhaps in the form of a characteristic curve, the rated and actual capacities can be compared. If the measured capacity is much lower than the rated capacity, the reasons should be explored. Possible reasons include:

- A high suction lift. This is likely to be a problem with pumps that draw from rivers whose level varies between the wet and dry seasons².
- Worn or damaged pump impeller.
- Undersized pump motor.
- Complicated pipework with high friction losses, resulting in a greater working head than assumed by the designer.

Further information on the analysis of pumped systems is given in the technical notes (1.3b). Where water is treated, information must also be gathered on the treatment facilities. What form of treatment is provided? (Normally settlement followed by slow sand filtration or rapid gravity sand filtration). Is chlorination provided and if so how effectively? What instrumentation is provided? (Ammeters and voltmeters on pumps, head loss gauges on filters, pressure gauges etc). Further information on the analysis of water treatment facilities is given in the technical notes (Module 1.3b). At the investigation stage, it will be important to obtain information about actual production capacity as well as rated production capacity.

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fill the SST. This is normally done over a period of several weeks so as to reduce the additional pumping capacity required.

² Even where there is no information on flows, a high suction lift should be viewed as a potential problem since it is likely to lead to cavitation, premature wear of impellers and a significant reduction in pump efficiency.
Where actual capacity is significantly less than rated capacity, the causes should be investigated.

The investigation should also cover operation and maintenance procedures. Questions to be asked include the following:

For slow sand filters Is the schmutzedeecke scraped when head losses become too great? Is sand replaced when the bed thickness falls below a minimum level?

For settlement tanks Is there any evidence of a build-up of sludge in the tanks? For upward flow tanks – how is alum added and mixed and is a sludge blanket forming? Are pre-chlorination facilities provided and are they working? Is there evidence that jar tests are carried out regularly to determine the most effective concentration of alum? If so, are the results of the tests being used to guide the process?

For rapid gravity sand filters Are head-loss indicators installed and operational? Are they used to determine when to backwash? Is there mud in the sand bed, suggesting that the filter sand needs replacing? Are there records of when backwashing and sand replacement were carried out?

For pumps Are ammeters, voltmeters and pressure gauges installed and working? If so, are records kept of readings? What information is available on routine maintenance – replacing gland packing, lubrication, replacing worn impellers etc?

Relating to chlorination is chlorine being regularly added and if so how? Are chorine residuals regularly measured and if so where and at what time intervals?

Presenting information on production facilities Show information on production facilities in a table modelled on Table 1.3.1. In the first instance, this should show information on existing facilities. As investigations continue, it can be expanded to include information on proposed new production facilities.

Table 1.3.1 Summary of existing and potential water production facilities

<table>
<thead>
<tr>
<th>Source no/location</th>
<th>Type</th>
<th>Distance from town (km)</th>
<th>Capacity (m3/hr)</th>
<th>Hours operated in typical day</th>
<th>Total daily production (m3/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CURRENT PRODUCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Facilities that are currently non-operational can be included in this table but it will be important to state that they currently non-operational and, if possible, indicate the reasons why.

Transmission mains

A water transmission main is required when a source is located some distance from the area that it is intended to serve. The most common transmission arrangements are:

- A gravity pipeline running from a spring or upland stream/river intake to a service reservoir. Such pipelines can be long, in some cases 20km or more and may serve a

3 Look particularly for evidence that chlorine gas is being added directly to the flow. This is likely to result in loss of chlorine gas in clear water tanks and pipelines, leading to premature deterioration of concreted and steel.
number of towns and villages. Figure 1.3.2 is a diagrammatic representation of a simple system of this type, serving two towns.

- A rising main from a borewell pump or river intake to a service reservoir, from which water is distributed by gravity. This arrangement (with a borehole pump) is shown in Figure 1.3.3.

![Figure 1.3.2 Simple multi-town/village system](image)

![Figure 1.3.3 Simple pumped system](image)

Analysis of transmission mains will be much easier if bulk meters are installed and working.
Figure 1.3.2 shows the four bulk meters, one at the intake, one on the delivery pipe to each distribution system and the last at the start of the transmission main between the two reservoirs. With these meters in place, it should be possible to determine the amount of water delivered to each distribution system and assess leakage and/or unauthorised water use along each leg of the transmission system. The two meters shown on Figure 1.3.3 allow a similar exercise to be conducted.

If bulk meters are not installed, it may still be possible to estimate flows by measuring the rates of rise and fall in the reservoirs, provided that sufficient valves are installed (and in working condition) to allow sections of the system to be isolated. For instance, if all outlets from the first reservoir are closed, measuring the rate of rise in the reservoir and knowing its cross-sectional area will allow you to calculate the flow through the first transmission main. Information obtained on actual flows can be checked against the theoretical capacity of each transmission main at the analysis stage.

For analysis purposes, it will also be necessary to have information on the main diameter and length and the levels at the inlet to and outlet from the main. If no information is readily available, this may require a physical survey, which should include verification of the location of any changes in the main diameter.

For pumped systems, it will also be important to obtain information on the characteristics of the pump. Pump manufacturers can provide characteristic curves for the pumps that they produce if information is not already to hand. (See the technical notes in 1.3b for more information).

One other point needs to be considered at this stage. Good practice requires that connections are not made directly from transmission mains, whether these be pumped or gravity-fed. However, it is possible that connections have been made directly to mains in the past. It may be, for instance, that some areas of a town are located above the level of its service reservoir and have thus been connected directly to the gravity main feeding the reservoir. Initial investigations should aim to establish the location and number of any such connections so that appropriate action can be taken later in the planning process.

**Elevated reservoirs**

Elevated reservoirs are used to balance flows and may also allow supply for a short period in the event of a pump or transmission main failure. Information should be collected on the capacity of each service reservoir, its condition (including details of any leaks), the inlet and outlet arrangements and the way in which the reservoir is used.

Estimate the capacity by measuring the plan area of the reservoir and the depth between the top and bottom water levels and multiplying them together. A simple sketch can be prepared showing the existing inlet, outlet and drainage arrangements.

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4 Where pumps are installed, it may be possible to estimate their discharge from voltmeter, ammeter and pressure gauge records. This will require an assumption about pump efficiency. It will only, of course, be possible if all meters and gauges are in working order.

5 If the main draws water from a tank and/or delivers directly into a tank, the relevant level will be the top water level in the tank.

6 First check whether there is any record or local knowledge of the main and changes in diameter. Next, check the size of the main at each end and, where there is clearly a change in diameter along its length investigate in the field to ascertain where the change or changes take place.

7 Good practice requires that a drain is provided in the reservoir to allow it to be emptied for maintenance purpose. To ensure continuity of supply during periods of maintenance, it will also
Next, investigate the supply and delivery regimes. On the supply side, is water supplied to the reservoir continuously (as will normally be the case for gravity-fed schemes) or for limited periods of the day (as will often be the case for reservoirs supplied by pumping)? On the delivery side, which areas are served and at what times? When investigating the delivery regime, look for on both the times at which water flows out of the reservoir and any valve operations that might be used to distribute water to different areas at different times.

**Distribution system and connections**

As already indicated, the first step in assessing the system should be to produce a plan or sketch of the system. The next stage in the analysis of the distribution system will be to develop this plan to show the routes, diameters, pipe materials and, if possible, age of existing mains. As already indicated, if no suitable base map is available, this may have to be diagrammatic. However, it should show the way in which the system relates to the existing road layout and the length of each main should be recorded. Where the system is fairly complicated, it may be appropriate to simplify it by showing only the mains above a certain size (typically 4” or 6” depending on the size of the system).

The system plan should show all valves and indicate whether or not they are functioning. As far as is possible, the aim should be to show which areas are served by which transmission mains, tubewells and/or elevated tanks. On the basis of this information is it possible to identify distinct supply zones? If not, assumptions will have to be made on the areas covered by future supply zones.

Work with information on demand to determine the present and likely future number of connections in each zone. Ideally, it should be possible to identify the number of connections along each leg of the system but records may not be detailed enough to allow this. Further information on the analysis of supply zones is given later.

In addition, record as much information as is available on the age, material and condition of each main. At the same time, collect any information on complaints, low pressure areas, leaks and pipe breaks. Use this information to obtain an initial idea of the areas in which action to replace distribution pipes and house connections might be justified.

### 1.3.4 ANALYSING THE SYSTEM

**Introduction**

In essence, analysis is about finding answers to the following basic questions:

- How does the existing system cope with the current demand for water?
- What operational changes and/or investments might be made to reduce costs and/or increase service levels.
- How might the system be expanded to meet currently unmet and potential future demands?

Assessing the ways in which the system has been augmented and changed in the past may help you to understand it and thus provide more realistic answers to these questions.

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normally be necessary to provide a by-pass to allow water to be delivered directly from the transmission main or production facility serving the service reservoir to the distribution system.

Some older distribution pipes in South Asia are prestressed cement concrete (PCC). It is very likely that these are leaking and their replacement should normally be a fairly high priority.
The analysis should normally start with the overall situation, comparing the amount of water produced with current and likely future demand, and then proceed to analysis of transmission, storage and distribution facilities serving the various areas of the town. At each stage, the analysis should include an assessment of the efficiency improvements that might be made. Bearing these general points in mind, we now turn to the analysis of the various system components.

The first step in the analysis should be to refine and develop the plan of the system to take account of the information collected during the previous stage in the planning process. Start by attempting to define supply zones. A supply zone is the area served by a service reservoir, a well or group of wells or a pumping facility. In some cases, the limits of supply zones will be clear. In others, some judgement will be needed to determine where one zone ends and the next zone begins. Indeed, there will be situations in which there are no clear zones. Where this is the case, it will normally be best to explore the options for zoning the system in the future. This may require capital investment in additional valves and new lengths of main to allow rationalisation and subdivision of the system.

Once individual zones have been identified, the next step will be to develop a summary of system information for that zone. This should cover:

- Production facilities serving the zone.
- Pumping, transmission and storage facilities serving the zone.
- The distribution system within the zone. As suggested previously, only larger mains should be shown in the first instance as this will simplify subsequent calculations.
- The number of connections within the zone and, if possible, their location in relation to individual distribution mains.

It will normally be useful to show the information in diagrammatic form. Once this basic information has been ordered, it will be possible to move on to more detailed analysis of the system. The overall procedure is suggested by Figure 1.3.4. Start by comparing available water and overall production with demand. Do this for the whole town. Where there is more than one production facility, the analysis will have to be refined to cover source availability, production and demand for each production facility/source.

The next step will be to analyse the way in which water is moved from the point of production to the consumer. This will required analysis of transmission, storage distribution and connections. Where a production facility or transmission main serves more than one supply zone, the analysis for that facility should be carried out in relation to the whole area that it serves.

A useful first step in analysis will be to identify any obvious deficiencies, such as pumps in poor condition, leaky transmission mains and service reservoirs etc. It will certainly be necessary to explore options for repairing/replacing these.

The various stages in the analysis process are now described in more detail.

**Analysis of water production in relation to demand**

Analysis of water production will normally start by comparing production with current and future demand. A good basic indicator is production capacity per person. As indicated in the previous section, analysis of water production must be carried out in relation to the area served by the particular production facility being analysed. However, even where production
is decentralised, it will usually be worthwhile to carry out a preliminary analysis of the situation in the town as a whole.

The first step in analysis should be to estimate the per-capita water production for the number of people currently served by the system.

If the entire community were served by individual house connections per-capita water production is given by the equation: \( q_1 = \frac{(Q_T - Q_i)}{(N_C \times H_{av})} \), where \( q_1 \) is average per-capita production, \( Q_T \) is total production, \( Q_i \) is the estimated institutional, commercial and industrial water use, \( N_C \) is the number of domestic connections and \( H_{av} \) is the average household size. This, however, is rarely the case, since households very often obtain water from neighbors and public standpipes. Nonetheless, per-capita water production can be estimated by the equation: \( q_1 = \frac{(Q_T - Q_i)}{(N_{HH} \times H_{av})} \), where \( N_{HH} \) is the number of households in the community that obtain water from the utility. Field surveys may be needed to obtain information on the number of households that obtain water from neighbors (shared yard taps) and the number of households that draw water from public standposts.

Later, it may be appropriate to refine the calculation by estimating per-capita production for different user groups (i.e. those with individual house connections and multiple fixtures within the home, those with individual yard taps, those with shared yard taps, and those that draw water from a public standpipe). This will be particularly useful in projecting current and/or future demand for the entire community.

Points to consider with regard to demand include:

- Current demand can be constrained by low production
- Current demand may reduce if tariffs go up
- The utility will want to sell more water to customers that can afford it
- Production may be limited by water resources

Use the calculated value of \( q_1 \), together with information on the current quality of service to assess the nature of current problems in serving the existing service population, as shown in Table 1.3.2.

Table 1.3.2 – How information on per-capita production and quality of service can inform assessment of problems and possible responses

<table>
<thead>
<tr>
<th>( q_1 )</th>
<th>% time production facilities operate</th>
<th>Quality of service</th>
<th>Likely nature of current problems and possible responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>low(^9)</td>
<td>High</td>
<td>Low</td>
<td>Inadequate production – need to increase production capacity</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Inadequate production – Explore barriers to increasing production period before considering</td>
</tr>
</tbody>
</table>

\(^9\) Information on significant industrial, commercial and institutional water demands should be obtained from billing records. There is a slight inconsistency in the calculation in that these will be consumption rather than production figures but this should not be significant, unless non-domestic use is very high. This will not normally be the case in small towns.

\(^{10}\) What constitutes a low level of production will vary from country to country. However, anything less than 30 litres per person per day will certainly be low while figures in excess of 150 litres per person per day will normally suggest that increasing production is not the most immediate priority.
High | High | Low | Probable losses in system – Investigation of leakage, wastage and illegal connections should be a priority
---|---|---|---
High | Low | High | There is probably adequate production to meet present and future demands.
High | High | High | Production adequate to meet current demands – Initial focus should be on increasing number of connections and expanding supply area.

It’s also important to compare current production to future demand. Comparing the production required to meet the future per-capita demand for water will provide an initial indication of the need to augment production in the future. The problem is that it’s not possible to accurately predict the future population for an individual town. For planning purposes it’s generally best to use average population growth rates in the area, and as noted in Module __, design on the basis of modular expansion. For example, at 3% population growth, the capacity of most system components should not exceed 25% of current demand, excepting transmission and primary distribution that should not exceed 75% of current demand. Provision should be made for unaccounted-for-water and peaking factors. In so doing, one should be aware that these can substantially increase the cost of construction. For example, providing for 50 lpcd including unaccounted-for-water, 75% excess capacity, and a 2.5 peaking factor results in transmission mains are sized for 220 lpcd, which is over 4 times the current demand.

Table 1.3.3 is a pro-forma for calculating the additional production required to meet future water needs. It may be appropriate to explore the additional production required for more than one future scenario, taking different assumptions about the rate at which additional connections are made to the system, the balance between house connections, individual and shared yard taps, and standpost supplies, the average water use from each type of connection, the level of unaccounted-for-water, and the number of hours for which production facilities operate. The market for additional connections will be influenced by the actions, considered later in this module, to extend and improve the distribution system and encourage more house connections and yard taps. Assessment of future demand may also entail an assessment of any likely/desired increase in per-capita water consumption\(^\text{11}\). Once again, emphasis (as discussed in module 0.4) should be on modular expansion in order to adapt most effectively to uncertain growth in demand – uncertain both in terms of the amount of water used and the location it will be needed.

The procedure described above will be sufficient in itself where there is one source of water for the town water supply system\(^\text{12}\). There will be cases in which there is more than one source of water for the town, for instance, when local distribution systems are served by single wells or groups of wells. Where this is the case, the analysis will have to be extended to include separate analysis of the various sources and the areas that they serve. The process followed will be essentially the same as that described above but information on

\(^{11}\) Ideally, design per-capita consumption figures should be based on analysis of demand. Where this is not possible, it may be necessary to take standard design figures but these should be assessed and, in the event that they appear to be too high, lowered.

\(^{12}\) In this context, a group of wells discharging to a single transmission main should be considered as a single source.
production and present and future demand will have to be disaggregated by supply zone. This will often require additional field investigations to determine the limits of supply zones and the number of connections in each supply zone.

**Analysis of water transmission and storage**

As indicated earlier, the main purpose of storage reservoirs and tanks is to provide capacity to balance supply and demand. That of transmission mains is to transport it from where it is produced to a point at which it can be distributed to consumers. Storage may be required between production and transmission or between transmission and distribution, as shown diagrammatically in Figure 1.3.4. Note that there will be situations in which the initial storage is omitted and water is pumped directly into the transmission main.

Water transmission and storage facilities should normally be analysed as a single unit since the volume of storage required will depend on the supply regime, which in turn will be influenced by the capacity of the transmission main.

The steps in the analysis are as follows:

- Assess production capacity. This provides the input at the upstream end of the system. Start with initial production capacity but analysis of options will also require information on proposed future capacity.
- Assess demand from the supply zone. Again, start with the existing situation but consider future scenarios as part of the analysis of options. Include an appropriate allowance for losses in the distribution system
- Estimate the variation in demand over the day, based on knowledge of the supply regime.

![Diagram](image)

**Figure 1.4.4 - Diagrammatic representation of storage and transmission**
Table 1.3.3  Pro-forma for estimating additional production capacity required

<table>
<thead>
<tr>
<th>Year</th>
<th>Existing/committed production</th>
<th>House connections</th>
<th>Standpost connections</th>
<th>Non – domestic demand</th>
<th>UAW</th>
<th>Total demand + UAW</th>
<th>Shortfall – total demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>HH size</td>
<td>Per-capita demand</td>
<td>Total demand</td>
<td>No.</td>
<td>Av no. of users</td>
<td>Per-capita demand</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes

1. UAW stands for unaccounted for water. If good metering is available, it may be calculated directly. (See the technical notes in module 1.3.b). Otherwise, it may be necessary to assume that it equates either to a percentage of total production or a set amount per connection/unit length of main.

2. In most towns, there will be additional categories of connection, for instance yard taps and shared yard taps. The table should be amended to take account of such variations.

3. Per-capita demand figures should be based on the best available information. Use official levels of service if these are practical. If using some other figure, provide some form of justification for its use.
• Check to ensure that the assessed demand and production figures are compatible. In general, production should equal demand plus a small allowance for transmission and reservoir losses although a greater allowance should be made if there is clear evidence of losses.

• Calculate the capacity of the transmission main, based on available information on pipe sizes, levels and pump characteristics (See the technical notes). If possible, cross-check the results of your calculations by comparing the calculated flow for the existing situation with actual flows estimated from field measurements.

• Assess storage capacity required for different production, transmission and demand regimes and check against capacity currently provided. This will normally have to be done for storage reservoirs/tanks at each end of the transmission main. (See the technical notes).

Box 1.3.1 Some notes on variation in demand
Where water is provided 24 hours per day, demand will vary with time, reaching a peak in the morning shortly after people get up. If bulk meter information is available, broken down by hour, the variation in supply over a typical day can be plotted. Otherwise, it will be necessary to assume the pattern of demand.

Where water is provided discontinuously, there will be less variation in flow during the times when water is available. When the supply time is very short, it will be reasonable to assume that demand remains constant over the periods when water is available and drops to zero at other times.

If this initial analysis shows that pumps are inadequate for the duty, storage is inadequate or there is a high head-loss in the main, upgrading options will need to be considered. We will return to this in Section 1.3.5.

Analysis of distribution
The next step in analysis will be to assess the need to reinforce and/or extend the distribution system to meet present and future demands. The steps in analysis will normally be as follows:

1. Look at the general configuration of the distribution system within the existing supply area. At what intervals are water mains provided? (Along every street and lane, only on larger streets, only along main through roads). Do some consumers have to lay a long connection to connect to the existing mains? The additional cost incurred in laying such connections may be deterring some people from connecting. Figure 1.3.5 is illustrative of the situation that is found in some African towns.

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13 This will not always be the case in practice. Leaky valves often mean that some water flows into areas that are nominally without supply, allowing the continuation of a low pressure supply. In most cases, the amount of water taken is low and the phenomenon can be ignored.
2. Where distribution mains are widely spaced, assess where existing connections are in relation to the public mains. (Omit this step if there is already a good distribution system). If most of the existing connections are clustered fairly close to the existing supply mains, an early focus of improvements may be to provide additional distribution mains in order to decrease connection distances and so encourage people to connect to the system.

3. Use information on the age and condition of pipes, together with any records of complaints about low pressure, visual evidence of leaks and records of pipe repairs to identify areas in which it may be advisable to replace existing pipes.

4. Prepare a diagram, showing a simplified version of the system, showing the source and the larger mains in the distribution system. Prepare the diagram in a way that is
compatible with a standard computer programme such as LOOP, BRANCH or EPANET, showing nodes at pipe junctions and at the ends of branched pipes. The diagram should show the elevation of the highest point served by each node and information should also be available on the top and bottom water levels of any service reservoirs and the characteristics of any pumps that serve the system directly.

5. Obtain information on current demands and allocate them to the appropriate node. (This will often need some judgement as to which demands should be allocated to which nodes).

6. Analyse the system, preferably using an appropriate computer programme. If possible calibrate your findings by comparing predicted pressures and flows for the existing situation against measured pressures and flows. Based on the results of this, consider possible actions as follows:

- If initial results show large discrepancies between actual and predicted pressures and flows, carry out further investigations in order to determine the reasons for the discrepancies. One possible reason is that the amount of water entering the system has been overestimated. Another is that there is a high level of unaccounted for water. If the latter is suspected, further analysis of the system to determine how and where water is being lost should be a priority.

- If the results show large head-losses in the system, with the result that peripheral areas have little or no pressure, consider options for reinforcing the system with additional distribution mains and/or increasing the period of supply to reduce peak flows.

- If water is being pumped directly into supply, explore the effect of adding a service reservoir. This may reduce peak flows and result in a general increase in pressures.

**Analysis of water quality and causes of contamination**

Until now, our focus has been on analysis of the quantity of water provided to consumers. Analysis must also concern itself with the quality of water. The main concern should be to ensure that water delivered to consumers is free of pathogens that can cause illness. These pathogens include viruses, bacteria, protozoa and helminths. The water can be considered free of these pathogens if tests show that it is substantially free of indicator organisms such as total and faecal coliform bacteria. High concentration of natural chemicals is also a concern, e.g. arsenic or fluorides, and requires periodic checking.

Contamination of water can occur at a number of points in the distribution system as illustrated diagrammatically in Figure 1.3.6. This figure was prepared for use in Indian towns and will have to modified for use in towns that have a different combination of system components. Nevertheless, the principles upon which it is based are generally applicable. It can be used as an analytical tool to assess the points at which contamination is likely to occur and to identify possible remedial actions.

The important point to note is that contamination in the distribution system will affect the quality of the water delivered to consumers and hence compromise safety, however good the quality of water that enters the distribution system. It is not sufficient to provide safe water, it also has to be distributed safely. Where contamination in the distribution system is occurring, action to deal with it will be a priority.
Contamination in the distribution system is caused by water leaking into a system and the best safeguard against this inward leakage is to ensure that the system is pressurised at all times. This requires a 24 hour supply, but this will not always be possible, at least in the short term. Where this is the case and distribution mains are left un-pressurised for long periods of time, analysis should focus on the ways in which contaminated water is entering water mains. Look particularly for water mains running through and/or along wastewater drains. Where such mains are found, replacing them with new mains laid some way from drains should be a priority.
Performance indicators

Performance indicators are necessary if improvements are to be monitored and the results of interventions evaluated. Performance indicators should be carefully chosen. They must be both measurable and relevant. A relevant performance indicator is one that measures a change that can reasonably be expected to occur as a result of the action to which it is supposed to relate. Key points to note when choosing performance indicators are listed below:

- Avoid indicators that relate to changes that might have occurred even if no action had been taken. (Unless it is possible to separate out the effect of new initiatives by comparing results with a control area in which no action has been taken).
- Avoid performance indicators that relate to changes that will be very difficult or impossible to attain. For instance, indicators relating the level of unaccounted-for-water (UAW) are likely to be fairly meaningless if there is insufficient information to accurately calculate the current level of UAW.
- Ensure that the information required to measure performance is available or can be made available at an affordable price.
- Ensure that the indicator is fairly easily definable and cannot be manipulated by water utility operations staff or others to give apparently more favourable results.

The following basic indicators for utility performance are suggested:

Operational:

- Is there a regular maintenance programme?
- Is there an up to date plan of the water system? A register of fixed assets? An inventory of spare parts and materials? Records for bulk and connection meters? Records for pump running times?
- Is there any plan to deal with efficiency improvements, e.g. unaccounted for water, pipe network performance, water pressure, metering.
- Is there a regular programme to monitor water quality?
- Is there any plan for expanding the system?

Technical operational efficiency:

- m³ production capacity / m³ into supply
- number of hours for which borehole and intake pumps operate
- m³ production capacity / m³ transmission main capacity
- number of hours of storage at average daily demand
- UFW: as a % of water into supply, or m³/km/day, or m³/conn/day
- Percent of water connections with an operating meter
- Number of pipe breaks per km per year

Indicators relating to customer satisfaction:

- Are customer complaints and their resolution logged?
- Average time taken to respond to a customer complaint
- Average time taken from receiving a request for a connection to the installation
- Number of people (households) with access to a connection / total population (number of households) in service area
- Duration of supply (hrs/day)
- Number of unscheduled interruptions per month lasting one hour or more
- Annual cost to users of 20 lpcd divided by GDP / capita

Annex 1.3.1 – Information required and the form it might take
<table>
<thead>
<tr>
<th>Facility</th>
<th>Form taken by information</th>
<th>Details of information required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of water</td>
<td>Spatial/Quantitative</td>
<td>Location, flows and capacities of potential surface water sources (rivers, canals and lakes) Location, depth and potential yield of aquifers Rainfall statistics (if rainwater catchment is to be considered)</td>
</tr>
<tr>
<td></td>
<td>Spatial/Quantitative</td>
<td>Location and yield/capacity of tubewells and/or water treatment works. In the case of tubewells, try to collect information on actual as well as rated capacity. In the case of water treatment works, determine the number and capacity of the different treatment units (See the technical notes in module 1.3.b), again considering rated and actual capacity.</td>
</tr>
<tr>
<td>Water transmission facilities</td>
<td>Spatial/Definitive</td>
<td>Routes, diameters and pipe materials for transmission mains</td>
</tr>
<tr>
<td>Service reservoirs (To balance flows and provide backup in the event of pump failure)</td>
<td>Spatial/Quantitative</td>
<td>Location, capacity and water levels of service reservoirs. Operational arrangements for service reservoirs. (It is not uncommon for service reservoirs to be provided but not used).</td>
</tr>
<tr>
<td>Distribution mains</td>
<td>Spatial/Definitive</td>
<td>Distribution main routes, diameters and pipe materials, together with information on valves and other fittings.</td>
</tr>
<tr>
<td>Connections and standpipes</td>
<td>Quantitative/Spatial</td>
<td>The number of connections, with domestic, commercial and industrial connections listed separately. Where possible provide separate information for each supply zone. (See later for discussion of supply zones and procedures for determining their limits). Where connections are metered, meter records may be used to estimate the total amount of water delivered to consumers. The number of standpipes/kiosks, if possible for each supply zone and if possible including information on number of users and, where appropriate, amount of water used.</td>
</tr>
</tbody>
</table>
This module provides guidance on a number of specific technical tasks that may be required to obtain a true picture of the current state of water facilities and services.

**Module content**
The module covers the following tasks:
- Assessing actual water production capacity
- Assessing the capacity of transmission mains
- Initial assessment of condition and output of water treatment facilities
- Graphical methods for estimating required reservoir capacity
- Methods for assessing unaccounted for water

### 1.3.b.1 – Assessing actual production capacity

Where a pump delivers water to a tank or reservoir, it will usually be possible to assess the discharge of the pump by measuring the rise in water level in the tank or reservoir over a set period of time. Of course, this will only be possible if it is possible to prevent outflow from the tank/reservoir while the test is being carried out.

The steps in investigation are as follows:

1. Confirm the plan dimensions of the receiving tank/reservoir and use them to calculate its cross-sectional area. (If two or more tanks/reservoirs are interconnected, it will be necessary to calculate their combined cross-sectional area.

2. Fill the tank/reservoir and then monitor the drop in water level if any over a period with no pumps either discharging to or drawing from the tanks or drawing from it. (Pick periods when there is normally no supply to the town and the tanks are not being filled) Any drop in water level will be an indication of leakage. The rate can be worked out easily if the plan dimensions of the tanks are known.

3. Measure the rise in water level in the tank/reservoir over a period with each pump/tubewell that supplies it operating in turn. Calculate the discharge of each pump, remembering to subtract the leakage previously measured calculating the amount pumped.

Use the following formula to calculate the discharge

\[
\text{Discharge} = \frac{(\text{Rise in level over time } T + \text{ fall in level without pumping over time } T) \times \text{ Area of tank or reservoir}}{T}
\]

where \(T\) is the time over which the rise in level is measured. It will be necessary to ensure that the units used are consistent. If the rise in level and area are measured in ft and square ft respectively and the time is recorded in seconds, the discharge will be measured in cusecs. If the rise in level and area are measured in metres and square metres respectively, the discharge will be in cubic metres per second. Multiply by 1000 to obtain the discharge in litres per second.

Measuring the discharge of from borewell/tubewell pumps that deliver directly into supply without using meters is more difficult. For small wells, it may be possible to measure the discharge directly by recording the time taken to fill a container of a known volume. Another option is to use a ‘trajectory’ method. To use this method, the outlet pipework from the pump has to be adjusted to give either vertical or horizontal free discharge. The flow can
then be calculated using an appropriate equation. For further information on both methods refer to [http://gwpa.uckac.edu/pdf/furrow_unknown_syphons.pdf](http://gwpa.uckac.edu/pdf/furrow_unknown_syphons.pdf)

The disadvantage of both direct measurement and trajectory methods is that they measure free discharge rather than discharge against the head in the transmission and distribution system. So, they will always overestimate flow. If the pump characteristics are known, a pressure gauge can be used to compare the pressures under testing and operating conditions and this information can then be used in conjunction with the characteristic curve to estimate flow.

Given these complications and the fact that adjustments in pipework will often have to be made on site to allow direct measurement and trajectory discharge methods to be used, it will normally be better to use a portable flow meter to measure the discharge from a well pump.

**Example – Investigation of water production and delivery at waterworks site, Jaranwala, Pakistan**

Jaranwala town receives much of its water supply from two tubewells located in the site of the old slow sand filter waterworks. These tubewells discharge to the waterworks clearwater tanks, from which water is lifted through two rising mains to two 50,000 gal elevated tanks. Each rising main is served by its own pump. The rated capacities of the two tubewells were 1 and 0.25 cusecs respectively and each was said to operate continuously (24 hours per day). The rated capacities of the two lift pumps were 1.5 cusecs and 0.8 cusecs respectively and analysis of working procedures suggested that each was operated for a total of about 7.25 hours each day. Initial analysis suggested that these figures were incompatible – it seemed that more water was entering the clearwater tank than was leaving it but there was no sign of overflow. This left three possibilities – first that the quoted operation times were incorrect, second that the rated pump capacities were incorrect and third that water was leaking from the clearwater tank.

An exercise was carried out to assess the inflow and outflow from the waterworks clearwater tanks. First, the area of the clearwater tanks was investigated. The investigation revealed that no less than four clearwater tanks were connected. So, the total plan area of these tanks had to be taken into account when assessing flows.

Next the level in the clearwater tanks was monitored with no inflow or outflow. This was done to establish whether or not there was any leakage from the tanks and, if so, to determine the rate of leakage. In the event, there was no leakage.

Next each tubewell in turn was operated for an hour and the resulting rise in level in each clearwater tank was measured. The total volume of water pumped during the hour was computed and so the tubewell’s delivery rate was calculated. The figures obtained were 0.42 cusecs and 0.2 cusecs, as compared with nominal ratings of 1 – 1.3 cusecs and 0.25 cusecs respectively.

Finally, the capacity of each of the two pumps delivering water from the clearwater tank to overhead tanks in the town centre was estimated. For this exercise, the rise in water level in the receiving tanks rather than the fall in level in the clearwater tanks was measured. (It would have been possible to cross-check by measuring both). The measured capacities of the pumps were similar to their rated capacities.

Once the capacity of the two delivery pumps was known, it was possible to carry out a water balance exercise to check that, taking account of the measured tubewell and pump
capacities and the periods for which they were normally operated, the amount of water entering the clearwater tanks was equal or nearly equal to the amount leaving. This exercise revealed that the apparent inflow was about 10\% less than the apparent outflow\textsuperscript{14}. This was deemed to be an acceptable result and the measured capacities were adopted for follow-up investigations.

\textsuperscript{14} One possible reason for the slight discrepancy may have been that some water from the tubewells was backflowing from the clearwater tanks into the slow sand filters, which also delivered a small amount of water into the system. (Measured but not described here).
1.3.b.2 – Assessing the capacity of transmission mains

Assessment of the capacity of a transmission main requires information on the levels at the inlet to and outlet from the main and on the diameter and length of the main itself. If no information is readily available, this may require a physical survey, which should include verification of the location of any changes in the main diameter. If water is pumped through the main, information on the pumps will also be required. If possible, obtain the characteristic curve for the pump, which should be available from the manufacturer, at least for recently manufactured pumps.

The flow through a gravity main will depend on the static head available and can be calculated from the equation \( H = \text{Friction loss} + \frac{V^2}{2g} \), where \( H \) is the available head (from top water level at upper end of main to top water level or centre of pipe level, whichever is higher, at the discharge end of the main), \( V \) is the velocity in the main and \( g \) is the acceleration due to gravity. In practice, the \( \frac{V^2}{2g} \) term will normally have a low value and can be ignored. So, the flow through the main can be equated directly with the friction loss and the velocity that will lead to that friction loss can be calculated. (Preferably using standard tables but it is also possible to use a simple head-loss expression such as the Hazen-Williams formula).

The capacity of rising (pumping) mains depends on both the static head against which water is being pumped, friction loss along the main and the capacity of the pump or pumps delivering water into the main. The best approach to calculation will normally be to use graphical methods, based on the characteristic curves of the main itself and the pump or pumps delivering water to it.

To produce the characteristic curve for the transmission main itself, first obtain information on the top water level in the reservoir or tank from which water is drawn and the higher of the delivery pipe level and the top water level in the tank/reservoir to which water is delivered. The difference between the two is the static head, which is made up of the static suction lift (below the pump) and the static delivery lift (above the pump). This is the head when there is no flow. To produce the characteristic curve, the friction head loss is calculated for a number of flows through the pipe and added to the static head. The results can be plotted graphically, as shown in Figure 1.3.b.1.

Increasing the size of the main has no impact on the static head but reduces friction losses and so results in a flatter characteristic curve. We will return to this shortly when we consider the approach to cost-effective design of transmission mains.
The next step will be to obtain the characteristic curve for each pump that delivers water to the rising main. A typical pump characteristic curve is reproduced in Figure 1.3.b.2.

To find the flow through the transmission main with one pump operating, all that needs to be done is to superimpose the pump characteristic curve over the system curve, as shown in Figure 1.3.b.3.
Figure 1.3.b.3 Transmission main and pump characteristic curves superimposes
The actual flow and head are represented by the point at which the two characteristic curves cross.

The characteristic curve for two or more pumps operating together in parallel is obtained by adding the flows together horizontally for any head, as illustrated in Figure 1.3.b.4.

Figure 1.3.b.4 Characteristic curve for pumps operating in parallel
Because of the curve of the system characteristic, two pumps operating together will not deliver twice as much water as one pump operating on its own.
The other way to increase flow is to increase the size of the delivery main so as to flatten the system characteristic curve and so move the intersection with the pump characteristic curve to the right on the diagram. This is most likely to be beneficial when the friction head is fairly large compared with the static head, which may be the case when either the transmission main is long and/or the static head is small.

A larger main means a larger capital cost but also reduced power costs. The designer’s job is to choose a combination of pump and main that will provide the best overall financial package for the municipality (capital and O&M charges over the design life of the installation (including replacing costs for pumps and motors after about 10-15 years). To do this, the O&M charges and future replacement charges must be capitalised and represented as a present value so that different options can be compared.

While considering the capital cost of pipe, the class of pipe should also be considered. In general, the most economical results will be achieved when the velocity in the main is in the range 0.6 to 1.2 m/s.
1.3.b.3 – Initial assessment of water treatment facilities

Process

The suggested assessment process involves the following steps:

1. Inspect the facility to determine the type of treatment provided and identify the individual steps in the treatment process.
2. Prepare a sketch showing the steps in the process.
3. Determine the dimensions of tanks and filters.
4. Assess the adequacy of each stage in the process, in terms of both rated capacity and current condition.
5. Assess options for rehabilitating/extending existing facilities and need for additional new facilities.

Water treatment will normally be based on either slow sand filtration or rapid gravity sand filtration with chlorination used to disinfect water and provide some protection against subsequent contamination in the distribution system.

Brief notes on the stages in the assessment process are given below, first for slow sand filtration and then for rapid gravity sand filtration.

**Slow sand filtration**

There are two stages in basic slow sand filtration. First, suspended solids are removed by sedimentation and then water is passed through the slow sand filter itself. Water is then stored in a clear water tank and chlorinated. Slow sand filters quickly become clogged when the turbidity of the incoming water is too high and so pre-treatment in ‘roughing’ filters may be required if the turbidity of the incoming raw water exceeds about 100 NTU (Nephelometric Turbidity Units) for long periods\(^ {15}\).

Assessment can start with the sedimentation basins. Are they in reasonable condition? Is there any indication of a sludge build up? What is their depth and retention time? Depth should normally be in the range 1.5 – 2.5 metres and detention time should be 4 – 12 hours. Take samples of the influent and settled water. Is there evidence that sedimentation is resulting in a reduction in turbidity?

Next, inspect the slow sand filters themselves. Check their size and calculate their design capacity, which will normally be based on a flow rate of 0.1 - 0.2 metres/hour (0.1 – 0.2 m\(^3\)/m\(^2\) bed area per hour). If possible, measure the actual flow through the sand filters in order to establish whether or not it is operating at or close to its design capacity.

Other questions to ask include the following:

1. Is there a headloss across the slow sand filter? In other words, is there a difference in top water levels above the filter and in the clear water tank. A small difference in level may indicate that the filter is being by-passed.
2. Is there evidence that the schmutzdecke is being scraped at regular intervals? If not, the filter will eventually clog up and deliver considerably less than its design capacity.
3. What is the source of the filter sand? The effective size of the sand should normally be in the range 0.15 to 0.35 mm, rather more coarse than will normally be found in natural river sands. If the sand is too fine, the filter bed will need to be scraped frequently and this will

\(^ {15}\) The simplest way to measure turbidity is to use a turbidity tube. Information on how to make a turbidity tube can be found on the internet.
have a serious impact on both the capacity of the filter and the quality of the filtered water.

4. Is there adequate provision for draining the filter to allow scraping of the schmutzdecke?


If roughing filters are installed, it will be necessary to determine whether they are working as intended. Information on the design of roughing filters is available in Wegelin, M., (1997), Surface Water Treatment by Roughing Filters: A Design, Construction and Operation Manual, published by SKAT, Switzerland.

Rapid gravity filtration

Rapid gravity filtration plants are more complex than slow sand filters but needs considerable less land. The stages in treatment may include:

- Aeration
- Coagulation
- Mixing and flocculation
- Sedimentation
- Filtration

Aeration is used to reduce tastes and odours and remove volatile organics and dissolved gases. In small treatment works, it may be provided using a cascade or a multiple tray system. In both, the water is introduced at a higher level and is then allowed to fall, creating turbulent flow conditions that trap air. There is relatively little to go wrong with simple aeration systems.

Coagulation is much more important to the treatment process. It brings together suspended solids so that they can be more easily settled in sedimentation tanks. The most common coagulant is aluminium sulphate (commonly known as alum). In a well-run waterworks, jar tests will be carried out regularly to establish concentration of alum that gives the best settlement results. Alum will then be mixed with water to produce a solution of defined strength that is then added to the raw water flow in a controlled way so as to produce the optimum alum concentration as determined by the jar tests. In practice, alum dosing equipment is frequently non-operational, jar tests are neglected and alum is added to the flow in an uncontrolled way. In such circumstances, settlement in sedimentation tanks is likely to be less than optimal. When visiting the waterworks, note whether alum mixing and dosing equipment has been installed and whether it is operational. Also, note whether there are records of jar tests and ask operators how the results of these tests are being used.

Mixing and flocculation. Alum will only have the desired effect of promoting coagulation if it is thoroughly mixed into the raw water stream. Mixing may be achieved by mechanical means but the preferred method for small waterworks will often be to use a hydraulic device such as a hydraulic jump, which may be preceded by a measuring flume. Little can go wrong with a hydraulic mixing device but check whether a mechanical device is installed and, if so, whether it is working.

Flocculation is the process by which water is gently agitated in order to allow suspended particles in the water to coalesce into larger masses that can then be removed by sedimentation. Flocculation can be achieved by gently mixing the water in a tank, using
slowly turning paddles. The flocculation tank should normally be designed to provide a retention of about 30 minutes with a water speed of between 15 and 45 cm per minute (0.5 – 1.5 ft per minute). It is also possible to provide hydraulic flocculation, using baffled channels, but the space requirements for this may be too great for small treatment works. Upward flow sedimentation tanks (see below) work on the basis that flocculation occurs as the water enters the tank, either at the bottom of the tank in hopper-bottomed tanks or in the centre feed of circular clarifiers.

Whichever mixing and flocculation methods are used, they will be ineffective unless the alum dosing arrangements are satisfactory so the main focus of initial assessment should be on the condition of alum dosing equipment and the adequacy or otherwise of alum dosing.

Sedimentation The purpose of sedimentation is to remove suspended particles from the water prior to filtration. The removal efficiency during sedimentation will determine the subsequent loading on the filter beds and will thus have a strong influence on their performance. The simplest form of sedimentation is horizontal flow sedimentation in rectangular basins. A horizontal flow sedimentation basin is deeper at the inlet end than the outflow end. Sludge collects at this end of the basin and is then manually removed, perhaps using high-pressure hoses.

Many smaller waterworks incorporate upwards flow sedimentation. In this system, water is introduced at the base of the sedimentation tank or clarifier and is discharged over weirs around the side of the tank. The aim is to control the flow so that a horizontal sludge blanket, consisting of flocs of coagulated material, develops at an intermediate level in the tank. The blanket acts as a strainer, attracting and taking out solids from the raw water as it rises in the tank. Solids collect in the bottom of the clarifier, from where they are drawn off through a pipe under hydrostatic pressure. Smaller tanks are hopper-bottomed and have no moving parts. Larger upward flow clarifiers are circular in shape. They incorporate a scraper attached to a bridge, driven by an electric motor so that it rotates slowly and draws sludge towards the centre of the clarifier, where it is drawn off under hydrostatic pressure.

When assessing sedimentation arrangements, start by calculating the theoretical capacity of sedimentation tanks. For horizontal flow tanks, the key parameters are the detention time (t) and the surface loading rate or settling velocity \( v_s \) (m\(^3\)/m\(^2\)/day or m/day):

\[
t = \frac{24V}{Q}
\]

\[
V_s = \frac{Q}{A}
\]

where \( V \) is the volume of the settling basin in m\(^3\) and \( Q \) is the flow rate in m\(^3\)/day.

For small installations with uncertain operation, the surface loading rate should lie in the range 20 – 30 m/d and the detention period should be between 3 and 4 hours. [Schulz, C.R and Okun, D.A (1984), *Surface Water Treatment for Communities in Developing Countries*, Wiley p 130].

Of course, these figures are only meaningful if the sedimentation tanks are reasonably proportioned (ideally a length to breadth ratio of at least 4 to 1) to avoid short circuiting and there is at least a basic level of regular maintenance. If initial investigation reveals that tanks are badly silted, desilting may be a cost effective first step towards improving treatment capacity and performance.

Upward flow clarifiers are typically designed at a surface loading of about 2 metres per hour. As with horizontal flow sedimentation tanks check both the theoretical capacity of existing facilities and operational problems. These might include failure to regularly remove sludge and poor settlement resulting from poor control of the alum dosing process. When inspecting circular clarifiers, check that the bridge can be and is being rotated. If there are significant operational deficiencies, cost effective planning requires that these should be dealt with before moving on to provide new facilities.

Filtration Rapid gravity filters use coarser sand than slow sand filters and work at higher surface loading rates. Because of the higher filtration rates, the space requirement for a
rival gravity plant is typically only about 20% of that required for slow sand filters. Most rapid gravity filters are open and operate under gravity but some smaller plants use pressure filters. In general, pressure filters should be avoided in small towns because the filter media cannot be monitored and they therefore require skilled operation and good maintenance. If pressure filters are already installed but not operating properly, serious consideration should be given to replacing them.

Rapid gravity filters consist of a sand bed, laid over gravel and a system of underdrains, all contained in a rectangular or circular structure. Water is fed into the space above the filter and passes vertically down through it until it reaches the underdrains, which lead it to the discharge to the clearwater tank. The rate at which water passes through the filter depends on its area, the grading of the sand, the head across the filter and the amount of filtered material that remains in the bed. Filtered material builds up over time and is removed by backwashing the filter with a mixture of water and air.

There are two options for operating filters. Constant rate filters use rate controllers to adjust resistance to the water flow and compensate for the increased head-loss in the filter media over time. The simplest form of control consists of a float on the surface of the water above the filter attached by a wire to a butterfly valve on the filter outlet pipe. An even simpler arrangement is to use declining rate filtration, in which no attempt is made to compensate for increased head-loss through the filter so that the throughput of water decreases with time.

Typical design parameters for a rapid gravity sand filter are given below:

- Filtration rate – 5 m/hr for simple plants, rising to around 15 m/hr or more for more sophisticated plants.
- Depth of bed - 30 – 45cm of gravel and 60 – 70 cm of sand.
- Sand size – 0.55 mm and higher effective size - stratified with smallest and lightest granules at the top and coarsest and heaviest at the bottom.
- Length of run between backwashings – typically 24 – 72 hours.

The theoretical capacity of the bed can be calculated on the basis of the design filtration rate. However, during initial inspection, look for evidence of operational deficiencies. Mud balling and cracking in the filter sand suggests that there has been a build up of fine ‘mud’ material over time and this will certainly affect the effectiveness and the capacity of the filter. Most plants are designed for constant rate filtration and it will be necessary to check whether the rate control devices are working.

A likely cause of mud-balling is excess turbidity in the water delivered to the filter. This may be a result of inadequate clarification, which in tum may be caused by the failure to remove sludge and/or the failure to form a sludge blanket. The latter, in turn, may well be the result of inadequate alum dosing procedures. The key point here is that the most cost-effective intervention in the short-term will often be to improve the operation of existing treatment facilities. This may require some investment, for instance in simple alum dosing equipment.

**Chlorination** Chlorination is one of the most important operations in the water treatment process. Chlorine may be provided either as a gas or in the form of hypochlorite or chlorinated lime (bleaching powder). Bleaching powder and hypochlorite are easier to use than gas but are more expensive.

Many existing waterworks are provided with a gas chlorinator, which normally delivers chlorine directly from a standard pressurised steel cylinder, which is replaced when it is empty. Check whether the chlorinator is working. It is not unknown for operators to feed gas directly from a chlorine bottle into the water flow, bypassing control equipment. Much of the chlorine gas delivered in this crude way is likely to escape into the atmosphere. Besides being very wasteful, this practice is dangerous and will result in rapid deterioration in concrete and steel structures, particularly the roof slabs of clearwater tanks. Conversely, if
no chlorine is added, there will be no protection against contamination and recontamination of the water. So, ensuring that chlorine equipment is installed and operating should be a priority.

**Some points on comparative costs.** Schulz and Okun (1984) quote some figures for the relationship between plant capacity and construction cost. They also provide information on the relative discounted costs (both construction and operation and maintenance) for rapid gravity and slow sand filtration plants.

They suggest that the relationship between construction cost and plant capacity can be given by a general equation of the form:

\[ C = aQ^b \]

where \( C \) is construction cost, \( Q \) is plant capacity and \( a \) and \( b \) are constants. The constant \( a \) will vary with time but the value of \( b \) should remain the same over time. The lower the value of \( b \), the greater the economies of scale. Schulz and Okun suggest that the value of \( b \) for slow sand filters in India was 0.86, suggesting that the economies of scale for this type of plant were fairly limited. This supports the case for building slow sand filters as modular units, increasing capacity to meet increasing demand. The economies of scale for rapid gravity sand filters are greater but even here, a staged approach to increasing treatment capacity in response to demand is likely to be cost effective. Schulz and Okun quote information produced by Sundarasan and Paramasivam (1981) which shows that slow sand filters were cheaper in overall discounted cost than rapid gravity filters at capacities less than about 15000 m\(^3\)/day.
1.3.b.4 - Graphical methods for estimating required reservoir capacity

The main purpose of reservoirs is to provide storage to accommodate differences between supply and demand. The first step in assessing the required capacity for a new reservoir or in considering how an existing reservoir might be better utilized will be to obtain or assume information on the delivery and outflow regimes. The steps in analysis are then as follows:

1. Draw a diagram with the ‘y’ axis representing cumulative demand and the ‘x’ axis representing time. The scale should be such that the total cumulative demand over a typical day can be accommodated on the ‘y’ axis. The ‘x’ axis should cover a single day from midnight to midnight but with space allowed to extend a few hours at the end of the previous day.

2. Plot cumulative demand over the 24 hour period, starting from the origin of the graph (zero cumulative demand at the first 12 midnight).

3. Plot cumulative supply over the same 24 hour period. (Cumulative supply over a 24 hour period should be the same as cumulative demand over the same period). In the first instance, this plot can also start at the origin but it will later have to be moved to the left as explained below.

4. Examine the supply and demand lines. The system will fail if the cumulative demand line is above the cumulative supply line at any point since this will mean that the volume of water in the reservoir is negative, which is of course impossible. To overcome this problem, move the whole cumulative supply line to the left and/or up. In physical terms, this is the equivalent of assuming that the reservoir has water in it at midnight rather than being empty.\(^{16}\)

5. Position the cumulative supply line so that it just touches the cumulative demand line at one point and is above it at all other points. In physical terms, this is equivalent to starting the day with enough water in the reservoir to allow it to just run dry but at the point at which supply starts to exceed demand.

6. At this point, the maximum distance between the supply and demand lines represents the maximum storage required in the reservoir to cater for variations in supply and demand over the day.

7. In practice, the reservoir should never be allowed to run dry and some additional allowance will have to be made to cater for the minimum volume/depth of water to be retained in the reservoir. This can be done graphically by moving the demand line up by an amount equivalent to the minimum volume to be left in the reservoir.

---

\(^{16}\) If pumping is discontinuous, moving the cumulative supply line up is the equivalent of providing initial storage while moving it to the left is the equivalent of moving the whole pumping cycle earlier.
Figure A4.1 Typical cumulative demand and supply diagram for a service reservoir

Figure A4.1 shows a typical cumulative demand and supply diagram for a service reservoir. The demand line has been derived from a information that shows that water is being delivered into supply for 24 hours per day. Two supply lines are shown, the one based on a continuous steady supply and the second based on discontinuous supply with larger pumps. The point that emerges immediately is that the discontinuous supply requires only about 60% of the storage required for the continuous supply. (in practice, this amount of storage would be required twice, first at 6am and second, as shown on the diagram at mid-day).

The great advantage of the graphical method is that it allows alternative pumping and supply arrangements to be investigated easily and quickly. For each supply option, a new cumulative demand diagram should be drawn and various supply options can then be explored.

Where there is a proposal to increase the capacity of a transmission main serving a service reservoir, the graphical method allows the storage capacity required for various transmission main options to be estimated. Once this has been done, the costs of various combinations of increased transmission capacity and increased reservoir capacity can be compared.
1.3.b.5 – Methods for estimating unaccounted for water

**Definition**

Unaccounted for water is water that enters the distribution system but is not delivered to customers who pay for it in some way. It may include water in some or all of the following categories:

- Distribution losses
- Water taken legally but either not billed or bills not collected
- Water taken illegally

The percentage of unaccounted-for water is a useful overall indicator of the operating efficiency of a water system.

**The water balance and its limitations**

One recognized way to calculate first the amount and then the percentage of unaccounted-for water is to measure the difference between the amount of water produced and the amount of water consumed by ‘legitimate’ customers. This comparison of the amounts of water produced and consumed is referred to as a water balance.

Where both the supply and individual connections are metered and the meters are accurate, it should be reasonably easy to carry out a water balance exercise.

Where the supply is metered or can be measured in the field and some individual connections are metered, it may be possible to arrive at a reasonable estimate of unaccounted-for water.

Where few connections are metered and/or it is difficult to assess the amount of water supplied, arriving at an accurate water balance will be very difficult if not impossible.

The decision tree (Figure A6.1) will help you to decide whether or not it will be worthwhile to attempt to draw up a water balance.

If both the supply and individual connections are metered, the only concern will be whether or not the meters are accurate. Where possible, field measurements should be carried out to check bulk metered readings. It is relatively easy to check user meters against other meters. All that needs to be done is to put the meter to be tested on the same standpipe line as a calibrated meter and compare the readings. If they are the same, the meter is accurate. If not, it may be possible to adjust it. If not, the meter should be discarded.

Using rated water production as the basis for estimating the level of unaccounted for water is more problematic because the water balance is the difference between two fairly similar figures so that errors in one or both figures will have a disproportionately large impact on the estimated percentage unaccounted for water. The simple example that follows illustrates this point:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water production (rated)</td>
<td>1200 cu metres per day</td>
</tr>
<tr>
<td>Water production (actual)</td>
<td>1000 cu metres per day</td>
</tr>
<tr>
<td>Metered consumption</td>
<td>900 cu. Metres per day.</td>
</tr>
</tbody>
</table>

\(^{17}\) Water is also used in waterworks for filter backwashing and other purposes but this is not strictly unaccounted for water as it is used before the water is pumped or gravitates into supply.
Figure A6.1 - Drawing up a water balance

Box A6.1 Why actual production may be different from rated production

Boreholes  The amount pumped from boreholes may reduce for a number of reasons. It may be that pumping has caused the groundwater table to drop and so has reduced the flow of water to the well. This is more likely to be a problem where several boreholes are located close to each other. Other common causes of a drop in borehole capacity include chemical encrustation of the screen due to bacteriological activity, plugging of the formation around the screen by fine sand and silt particles that have been pulled with the water that is drawn towards the screen and pumping of sand due to poor well design or corrosion of the well screen.

Springs  The capacity of a spring may reduce over time as fine material is pulled into the ground around the spring. The capacity of the spring will also be affected, perhaps significantly, by changes in the groundwater level.

Rapid gravity sand filters  The capacity of rapid gravity sand filters is likely to reduce if backwashing is neglected or backwashing velocities are too low, with the result that mudballs form and replace some of the filter sand. The response to this may be more frequent backwashing but the increased requirement for backwash water will in itself reduce capacity. When basic instruments such as head-loss gauges are missing, the filters may not be operated in an optimum way.

Slow sand filters  As with rapid gravity sand filters, the capacity of slow sand filters will reduce if routine cleaning, in this case scraping of the sand surface, is neglected. Capacity may also be restricted if the sand used in the filter bed is too fine.

Apparent percentage unaccounted for water is 300/1200 or 25%. Actual percentage unaccounted for water is 100/1000 or 10%. Box _ gives reasons why the actual capacity of production facilities may be different from their rated capacity.

Where individual consumers are metered, it should be worthwhile to try to overcome this problem by measuring production, using the methods described in Annex 2. Where
individual consumers are not metered, it will be almost impossible to draw up a water balance. We now turn to the options for action when it is not possible to draw up a water balance.

**How to proceed if it is not possible to draw up a water balance**

If it is not possible to draw up an accurate water balance, it will not be possible to obtain an exact estimate of the level of unaccounted for water. Where this is the case, other methods will have to be used to assess the relative importance distribution losses, water taken legally but not billed and water taken illegally. Brief guidance on each of these is given below.

**Distribution losses**

It is possible to adopt either a passive or proactive approach to leak detection. In the passive approach, only those leaks that are self-evident are located and repaired. A leak may be obvious because it shows on the surface or may be inferred from the fact that consumers report a sudden unexplained drop in pressure. Metering data may also be used to identify the mains and supply areas that are experiencing higher levels of leakage. The proactive approach involves specific efforts to detect leakage using special sounding equipment. As a general rule, the aim should be to develop a good passive strategy for leak detection before moving on to consider proactive methods.

Where water is provided on a 24 hours per day (24/7) basis, it will be possible to obtain an idea of the level of leakage by measuring the amount of water that is entering the system during the night, when few if any consumers are likely to be using water. The normal practice is to measure this 'nightline' flow between around 3am in the morning – perhaps between 2am and 4am. Where there are no in-situ bulk meters, measurements can be made using a portable non-invasive flow meter.

Where the flow is not continuous, as will often be the case, assessing losses becomes much more difficult. The best option will probably be to develop a qualitative understanding of losses and where they are likely to occur. The stages in this process might be as follows:

1. **Subdivide the system for analysis purposes.** If possible, identify any areas that are known to have low pressures (which might be an indication of leakage) and/or mains that are either old or known to be of a material that tends to leak. (In some systems in South Asia, for instance, reinforced concrete pipes have been used in the past for both transmission and distribution mains. These tend to leak at joints and so may be a significant source of leakage).

2. **Assess losses from transmission mains.** Determine whether:
   - there are any connections (sanctioned or unsanctioned) to these mains;
   - there is significant leakage from each main

In the event that there are direct connections, the probability is that they are receiving more than their fair share of water. The possibilities for disconnecting them from the main and supplying them in some other way should be considered. If this is not possible, these connections should certainly be metered so that consumers pay for the water that they consume.

When assessing leakage, first walk or drive the length of the transmission main and look for evidence of major leaks. In some cases, it may be possible to see the leak itself, perhaps because water can be seen leaking at valve chambers, from flanges on river
crossings or from ‘springs’ along the route of the pipeline. In areas with a pronounced dry season, vegetation may reveal leaks. When everything is dry, a patch of green grass along the line of a pipeline is a clear indicator of a leak.

3. **Inspect reservoirs and elevated tanks for leaks.** If possible, take each out of service and inspect it internally.

4. **Assess leakage from the distribution system.** As with transmission mains, the first step will normally be to inspect the system for any obvious leaks. Another point to consider is the operating pressure. Look for evidence that the operators keep operating pressures low in particular zones/areas to prevent leakage and pipe bursts. Any such zones/areas should be investigated and replacing leaky pipes should receive high priority in the action-planning programme.

5. **Assess leakage from house connections.** Leakage from house connections can be significant, particularly when these are galvanised steel and/or the connection to the distribution main is poorly made. Because leakage from house connections is diffuse, it is hard to detect. Each individual leak may be quite small but the overall impact on the system can be significant.

Consider house connections at the same time that you are assessing leakage from the distribution system, focusing first on areas in which the system is old and/or there is evidence (consumer complaints, unexplained low pressure etc\(^{18}\)) that leakage may be a problem. Excavate around a number of connections to assess their condition and the state of the connection to the public main. If this assessment shows that there are problems, a programme to replace connections throughout the area should be a priority. If possible, this should involve the use of polyethylene pipes. Connections to mains should always be made in accordance with the pipe manufacturer’s recommendations, using approved equipment and materials. If such equipment is not available, obtaining it and providing training in its use to water utility operations staff should be a priority.

**Water not billed**

As indicated earlier, water may remain unbilled because either bills have not been collected or there are illegal connections. The focus is often on illegal connections and these clearly should not be ignored. However, experience suggests that problems with billing are not uncommon.

Bills may not be paid because either:

- the bill is not issued; or
- the bill is issued but the customer does not pay.

The steps in the investigation of bills that have not been paid should normally be as follows:

- Analyse connection and billing records.
- Check that all new connections are registered and transferred to the record of consumers held by the billing section.
- Establish whether or not the billing record includes information (ideally addresses but failing this an indication of the area in which the connection is located) that can be used

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\(^{18}\) For intermittently pressurised systems, another possible indicator of local leakage is poor water quality, which may be caused by backflow of wastewater from drains during periods when the main is not pressurised.
to locate and follow up on consumers who have not paid. If there is currently insufficient information, develop an improved system for identifying consumers and ensuring that they have paid their bills.

- Ensure that all consumers are receiving a bill\(^\text{19}\).
- Identify any areas in which the majority of consumers are withholding payments because of the quality of the service. In such areas, the focus should be on an integrated approach to service improvement and recovery of arrears, with the initial focus being on improving the service.

The last point suggests a need for some means of identifying where customers are located. Ideally, each customer record should include a name, information on the type of connection (domestic, commercial, institutional) and whether it is metered and an address. Where there are no street names and numbers, it will not be possible to give an address but the record should at least identify the area in which the customer lives. This will only be possible if:

- There is a plan on which ‘billing’ areas can be shown. This does not have to be to scale. The important requirement is that billing areas can be identified.
- It is possible to define the boundaries of those billing areas. Ideally, the areas chosen should coincide with existing administrative, political or social sub-divisions. Where this is not possible, chose clearly defined boundaries such as through roads. Billing areas should not, in any case, extend across more than one supply zone.

Billing areas should not be too large. As a general rule of thumb, each area should have between 200 and 500 connections.

The first step in reducing the number of illegal connections should be to identify each connection. If information is not already available, this will require a survey. Subsequent action will be easier if this is related to the billing areas described in the previous paragraph. Once information on illegal connections is available, their users should be offered the choice of either regularising the connection or being disconnected. It will normally be better to regularise than to disconnect and, in order to promote this option, it may be appropriate to allow the connection fee to be paid in a number of instalments.

Before a connection is regularised, it should be checked to ensure that it meets with the basic requirements of the water utility. In particular, the possibility that it has been badly executed and is therefore likely to leak should be considered. If in doubt, the connection to the public main should be excavated, inspected and, if necessary, replaced.

\(^\text{19}\) In Faisalabad, Pakistan, this was done by sending each consumer a sheet containing information on saving water along with the bill. Customers were then surveyed to ascertain whether or not they had received the information on water saving. A positive answer to this question meant that they had also received the bill so that receipt of the bill could be checked without asking customers directly whether they had received it. So, there was less chance that customers would say that they had not received the bill and use this as an excuse for not paying it.
The purpose of this module is to guide assessment of the utility’s financial viability, i.e. its ability to cover its own day to day expenses and, ultimately, to finance growth from its own cash flows. The module provides guidance on gathering input data for running a simple financial model of the utility, such as the one provided as part of this Guidance Manual, and developing a set of baseline financial performance indicators against which future improvements can be judged. This data should be fed into and analysed in the Initial Assessment Report at the end of Step 1.

Module content
- A guide to evaluating a town water utility's financial viability
- Instructions for presenting the financial assessment in the Initial Assessment Report
- A guide to financial statements and their role in business planning (Annex A)
- A questionnaire to gather financial data from the town water utility – attached as Module 1.4b
- Two financial models – a conventional “town water financial model” (TWFM) and a cash flow model (CFM) – Use of the models is described in module 1.6

What do we mean by financial viability?

The objective of the financial assessment is to judge the town utility’s financial viability. What do we mean by this? Unfortunately, the answer is not as clear cut as we might like. Put briefly, financial viability means meeting an agreed financial goal, but agreed financial goals come in almost every conceivable variety.

A strong definition of financial viability is as follows: viability is demonstrated by the ability to generate funds sufficient to cover all operating expenses and debt service while still providing an acceptable return on the funds invested in it. Much weaker definitions are in force in some instances, however. For example, a category C urban water supply authority in Tanzania is not expected to meet the costs of permanent staff or electricity costs from tariff income, a category B urban water supply authority is not expected to meet the costs of permanent staff, while a category A urban water supply authority is expected to meet both sets of costs.

For practical purposes, the most relevant goals are (in ascending order of difficulty):

- covering operating and maintenance (O&M) expenses from cash collections;
- covering O&M expenses plus depreciation charges from income;
- meeting all operating and investment costs from income.

Without clear definitions these goals do not mean very much. For example: what precisely is “maintenance”? Maintenance is not a category of expenditure recognised by accountants and difficulties can arise over the distinction between capital maintenance (replacement of fixed assets) and reactive maintenance. Depreciation charges also need close scrutiny as they are often based on historic costs at a time when price levels were much lower than they are currently.

Sometimes, goals are set, often in addition to those set out above, that are somewhat wider or more qualitative, such as:
• attract private sector participation in the financing and delivery of services;
• manage available resources more efficiently and responsively.

**Municipal finances**

It is a premise of successful business planning that water services enjoy a fair degree of management and financial autonomy or at least will do so during the planning horizon. In some countries (e.g. India) such autonomy would require wide ranging legislative and institutional change. In the meantime, business planning has to acknowledge the finances of the municipality as a whole. Unfortunately, this is beyond the remit of this guidance.

### 1.4.1 - Evaluating a Town Water Utility’s Financial Viability

**Evaluating the financial context**

However small the utility, it will be important to understand its financial context. This understanding can be gleaned by use of an institutional questionnaire (Module 1.2. on “Assessing the institutional arrangements”) and a financial questionnaire (Module 1.4b).

The former concentrates on such questions as:

- who owns the town water utility? Does it lease or own the assets it uses?
- is the town water utility financially autonomous? If not, where does it turn to for subsidies, who authorises expenditure?

The financial questionnaire concerns itself with both broad financial issues – such as accounting standards in use – as well as detailed questions concerning cash collections etc.

**Understanding the cash cycle**

A town water utility is much like any small business: its primary concern should be to have sufficient cash to run its day to day business. Having sufficient cash is all important: cash to pay wages (and social taxes), cash to pay suppliers and the bank, and cash to replenish stocks of spare parts. The diagram below shows the cash cycle (the upper part of the diagram) and its link to investment expenditure (the lower part).

Such a diagram, with sources of funds and priorities of fund utilisation marked on it, forms a useful part of the initial assessment.

**Figure 1.4.1  The cash cycle**
Where do problems typically lie?

The biggest problems nearly always lie around the upper right hand part of Figure 1.4.1. For example:

- new connections do not make their way to the customer database so new customers are not billed
- illegal connections and abstractions
- the customer database is of poor quality: entries are missing, duplicated or incorrect. The result is that billings are highly inaccurate, bills are disputed and the utility lacks credibility;
- cash collections fall well short of billings: customers are late in paying, or refuse to pay or collude with meter readers to reduce payments to the utility.

On the left hand side, there may be ghost employees, inefficient plant using too much fuel or labour, over-invoicing for supplies or board members drawing large amounts in fees and expenses.

How can you tell whether those problems are acute in the town utility under review?

Most small water utilities will not have monthly management accounts from which a third party can infer an impending cash flow crisis. The best way of finding out is simply to ask staff whether they are paid on time. Another approach is to ask for a recent supplier’s invoice (the best is from the power utility) to see whether there is a large amount for arrears.

To go any further in the assessment, it would be necessary to compile some basic financial statement (see Annex A for a quick introduction to how you can interpret financial statements when they exist).

The kind of records held by a utility will depend on the method of accounting being followed. If it uses an accrual based system then it will maintain debtors and creditors ledgers, but will
not do so if cash accounting is in use. However, almost without exception, water utilities keep the following paper records:

- bills issued and cash received;
- invoices received and payments made;
- bank statements;
- records of wages paid.

With these records, a utility can ascertain its cash position and probably compile a cash flow statement. It may be able to prepare an income and expenditure statement (with some effort required to identify which sums should be recognised for which periods). What it may not be able to do is prepare a balance sheet (because it has no records of the total amount of unpaid bills – debtors – or invoices that it has not settled – creditors. Nor is it likely to have an asset register or be in a position to calculate the depreciation charges on its fixed assets)

Of these, the principal weakness is probably ignorance of the debtors’ and creditors’ positions: ignorance in this area may amount to ignorance of impending cash flow problems. Rectifying this really means moving away from reliance on manual records to using spreadsheets or database applications. For the larger utilities it will be worthwhile investing in financial software.

The other area of record-keeping that is essential to financial health is the customer database. A poor quality database can easily undermine the financial viability of the utility. Assessing the quality of the database means checking reality on the ground against a sample of records. Cleaning up a large database is a laborious business. It means checking every entry on the ground and visiting every property that does not appear on the database.

**What are the sources of information**

The information required to complete the financial assessment is normally available from the utility itself. In some instances information, particularly concerning the financial context and investment responsibilities, is also available from the local authority. Where there is no distinction between the local authority and the utility (or the utility is a municipal department), then all the information should be available from the local authority.

A questionnaire accompanies this guidance (see Module 1.4b). It is intended only as a guide to information gathering: in some cases utilities will already produce reports that enable an assessment to be completed. Users will need to make their own judgements about this. The questionnaire is designed for general use, so far as this is possible, and will therefore require review and editing before use in any specific location.

**What type of financial indicators should you look at?**

Financial indicators are ratios that give an insight into a utility’s financial performance and allow future performance monitoring.

However, before embarking on ratio analysis, consultants/advisors should be aware of the points listed in the text box below.
The technique of ratio analysis is a useful tool to analyze a utility’s financial position. The indicators presented here provide information about efficiency and operational performance, creditworthiness and liquidity and profitability. As such they provide insight into areas that merit further investigation but they do not in themselves provide definitive answers on a utility’s financial condition. They should be calculated using information contained in the utility’s annual financial reports (preferably audited). Indicators can be volatile (the collection ratio often displays volatility – for example, if a large user sometimes settles and sometimes fails to settle just before a balance sheet date). If this is the case, calculating the ratio over a two or three year period may be wise.

Only a selected group of financial indicators is presented in this module, since the objective is not to overwhelm the reader with information that in most cases is unlikely to be of relevance.

Below, we propose two lists of indicators:

- the “short list” of financial indicators contains the indicators considered essential and achievable for even the least sophisticated water utility;
- the “long list” of financial indicators comprises those indicators considered to be suitable for small water utilities of varying degrees of sophistication – from those with hand written records of cash received to those using accruals accounting and able to produce financial statements to a recognised standard.

Table 1.4.1 shows the indicators that can be calculated from sparse information. For a utility with minimum information (“Tier 1”), it should be possible to calculate or estimate indicators that demonstrate its cash flow position and its operational efficiency. If billings data are also available (“Tier 2 utility”), it should be possible to also estimate its coverage of O&M, collection ratio and profitability.

Table 1.4.1 A short list of financial indicators – Basic requirements

<table>
<thead>
<tr>
<th>Utility with minimum information (“Tier 1”)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Data needed</td>
<td></td>
</tr>
<tr>
<td>Cash collected</td>
<td></td>
</tr>
<tr>
<td>Estimate of operating expenses (excluding depreciation charges)</td>
<td></td>
</tr>
<tr>
<td>Utility with minimum information (&quot;Tier 1&quot;)</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Estimate of m$^3$ into supply</td>
<td></td>
</tr>
<tr>
<td>kWh or litres of fuel or energy expenses</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
</tr>
<tr>
<td>Cash collected/m$^3$ into supply (1.4)</td>
<td></td>
</tr>
<tr>
<td>Operational ratio (1.7)</td>
<td></td>
</tr>
<tr>
<td>Operating expenses per m$^3$ into supply (2.1)</td>
<td></td>
</tr>
<tr>
<td>Unit energy use (2.2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utility with information as “Tier 1” plus income (billings) (&quot;Tier 2&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional data needed</td>
</tr>
<tr>
<td>Income (billings)</td>
</tr>
<tr>
<td>Additional indicators possible</td>
</tr>
<tr>
<td>Income/m$^3$ into supply (1.2)</td>
</tr>
<tr>
<td>Coverage of O&amp;M (1.5)</td>
</tr>
<tr>
<td>Profitability (3.1)</td>
</tr>
<tr>
<td>Collection ratio (4.3)</td>
</tr>
</tbody>
</table>

*Note: numbers after each indicator refer to the long list of indicators in Table 1.4.2 below*

Where more financial data are readily available, it may be possible to carry out a more comprehensive assessment of the town utility's financial viability. A long list of indicators for this assessment is presented in Table 1.4.2 below. The table also sets out which of those indicators would be most appropriate for town utilities, depending on their level of sophistication.

The indicators are grouped together under the following headings:

- cost recovery, i.e. the extent to which the utility recovers all its costs in the form of cash or income from its customers;
- profitability, i.e. the extent to which the utility generates a profit for its owners;
- liquidity, i.e. the utility's ability to meet creditors' claims as they fall due.
Table 1.4.2  A long list of financial indicators – for a more comprehensive evaluation of the utility’s financial viability

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Definition</th>
<th>Data least likely to be available</th>
<th>Suitability for small town water utility</th>
<th>Indication of good or improving performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rank (1=low)</td>
<td>Commentary</td>
<td></td>
</tr>
<tr>
<td>Cost recovery</td>
<td>1.1</td>
<td>Income (h) (billings)/m(^3) delivered</td>
<td>Clear from title</td>
<td>m(^3) delivered or billed</td>
<td>m(^3) values often unobtainable or very unreliable, likewise revenue</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>Income (billings)/m(^3) into supply</td>
<td>Clear from title</td>
<td>m(^3) into supply</td>
<td>m(^3) into supply more easily estimated than m(^3) delivered</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>Cash collected/m(^3) delivered</td>
<td>Clear from title</td>
<td>m(^3) delivered or billed</td>
<td>Cash more readily available than revenue</td>
</tr>
<tr>
<td></td>
<td>1.4</td>
<td>Cash collected/m(^3) into supply</td>
<td>Clear from title</td>
<td>m(^3) into supply</td>
<td>Both cash and m(^3) into supply should be available</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>Coverage of O&amp;M (^c)</td>
<td>Income and operating expenses (^d)</td>
<td>Income</td>
<td>4= See also 1.7.</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
<td>Coverage of OM&amp;D (^m)</td>
<td>Income and operating expenses including depreciation and interest charges</td>
<td>Income and depreciation charges</td>
<td>4= As 1.5. Depreciation charges often somewhat arbitrary and affected by inflation</td>
</tr>
<tr>
<td></td>
<td>1.7</td>
<td>Cash collected ÷ operating expenses (^g)</td>
<td>As title</td>
<td>Operating expenses</td>
<td>5 Good indicator. Indicates positive operating cash flows if all expenses met without delay</td>
</tr>
<tr>
<td>Operational efficiency</td>
<td>2.1</td>
<td>Operating expenses (^d) per m(^3) into supply</td>
<td>Clear from title</td>
<td>m(^3) into supply</td>
<td>Cash disbursements could replace operating expenses if necessary</td>
</tr>
<tr>
<td></td>
<td>2.2</td>
<td>Unit energy use</td>
<td>Energy expenses + m(^3) into supply</td>
<td>m(^3) into supply</td>
<td>kWh or litres of diesel, if available, are better than energy expenses</td>
</tr>
<tr>
<td>Profitability</td>
<td>3.1</td>
<td>Profitability (^a) (%)</td>
<td>Profit and income</td>
<td>Profit and income</td>
<td>Not an easy indicator to interpret Not particularly, as high values may mask cash flow problems</td>
</tr>
<tr>
<td></td>
<td>3.2</td>
<td>Return on capital employed (ROCE)</td>
<td>All items</td>
<td>1</td>
<td>Increasing percent to point where ROCE = cost of capital</td>
</tr>
</tbody>
</table>

---

\(^a\) Income ÷ operating expenses

\(^b\) Profit + income

\(^c\) Income + operating expenses

\(^d\) Income ÷ operating expenses including depreciation and interest charges

\(^e\) Income ÷ (shareholders’ funds + debt)
<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Definition</th>
<th>Data least likely to be available</th>
<th>Rank (1=low)</th>
<th>Commentary</th>
<th>Indication of good or improving performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity</td>
<td>4.1 Current ratio</td>
<td>current assets ÷ current liabilities</td>
<td>Both data items</td>
<td>1</td>
<td>Not easy to interpret even if data available as quality of current assets open to interpretation</td>
<td>Should be &gt;1 but otherwise would not expect a trend</td>
</tr>
<tr>
<td></td>
<td>4.2 Quick ratio</td>
<td>(current assets-stock) ÷ current liabilities</td>
<td>All data items</td>
<td>2</td>
<td>A better indicator than the current ratio, but still difficult to interpret (for same reason)</td>
<td>As above</td>
</tr>
<tr>
<td></td>
<td>4.3 Collection ratio (CR)</td>
<td>cash collected ÷ billings as %</td>
<td>Billings</td>
<td>3</td>
<td>Useful indicator, but care needed over interpretation – ideally several years needed to give a reliable picture</td>
<td>A poor utility may have a CR as low as 70%; good performance would be &gt;90%. Should rise over time.</td>
</tr>
<tr>
<td></td>
<td>4.4 Debt level ratio</td>
<td>trade debtors as percent of revenue (billings)</td>
<td>Debtor and billings</td>
<td>2</td>
<td>Useful indicator albeit sophisticated(^e). Data requirements likely to be too onerous for a small utility. A close relative of debtors turnover or average collection period (average debtors ÷ daily revenue).</td>
<td>Falling over time (20% appears in some loan covenants but depends on local circumstances). A rising ratio (or collection period) is cause for concern when inflation and interest rates are high (late payment penalties may not reflect opportunity cost of working capital increase).</td>
</tr>
<tr>
<td></td>
<td>4.5 Debt service cover ratio (DSCR)</td>
<td>free cash flow ÷ debt service due in year</td>
<td>All data items</td>
<td>1</td>
<td>Sophisticated indicator frequently prescribed in loan agreements. Only relevant to utilities with significant investment responsibilities</td>
<td>Loan agreements typically prescribe minimum of c 1.2</td>
</tr>
</tbody>
</table>

Notes:  
(a) i.e. after removing the effect of inflation. For example, if the indicator rises by 21% but inflation is 10%, the real increase = \((1.21/1.10)-1 = 10\)  
(b) strictly, profit should be profit before interest and tax (PBIT) and both profit and revenue should reflect the utility’s “ordinary” business and exclude income and profit from making new connections  
(c) the inverse of this ratio, known as the operating ratio (=operating expenses ÷ revenue), is also used  
(d) unless otherwise indicated, operating expenses exclude depreciation charges and interest expenses (together known as capital charges) and connection costs  
(e) “sophisticated” as effect of inflation complex – if inflation rates are high, debtors (if not revalued) are likely to fall relative to revenue (if tariffs keep pace with inflation) with no improvement in real financial performance  
(f) operating cash flow less essential capital expenditure  
(g) also sometimes known as the “operational ratio”, but to avoid confusion with “operating ratio” suggest full definition is used as title  
(h) strictly, “income” should include water sales, income from connection charges and other income. For indicator purposes, connection charge income should be excluded. Billings are for all practical purposes the same as water sales and can be used instead of income in this context
(i) a variant – and one that sometimes appears in loan agreements – would be to specify particular assets (e.g. those with a short life) whose depreciation charges are to be covered by cash collections.
1.4.2 - Presenting a Financial Assessment in the Initial Assessment Report

The financial assessment section in the Initial Assessment Report should present the results of the evaluation.

How can information be compiled?

The information required to complete the financial assessment will normally be available from the utility itself. In some instances information, particularly concerning the financial context and investment responsibilities, will also come from the local authority.

A questionnaire accompanies this guidance (module 1.4b). It is intended only as a guide to information gathering: in some cases utilities will already produce reports that enable an assessment to be completed. Users will need to make their own judgements about this. The questionnaire is designed for general use, so far as this is possible, and will therefore require review and editing before use in any specific location.

What kind of information can you report?

What goes into this report will depend on the information available and the level of sophistication of the utility for keeping records and preparing financial statements. An indicative set of headings appears in the Guidance Manual.

Utility with minimum information (“Tier 1”)

For a tier 1 utility it will only be possible to compile an approximate cash flow statement, showing the short list of indicators as per Table 1.4.1. Ideally, the statements and indicators should cover the last three years, so that trends can be observed. Table 1.4.3 summarises the items that should, at a minimum, be covered by the assessment.

Table 1.4.3 Assessment of a tier 1 utility

<table>
<thead>
<tr>
<th>Data item and financial indicators</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash collected</td>
<td>Ideally: increasing in constant prices and increasing (also at constant prices) per connection</td>
</tr>
<tr>
<td>Estimate of operating expenses (excl depreciation)</td>
<td>As cash collected</td>
</tr>
<tr>
<td>Estimate of m(^3) into supply</td>
<td>Interpret using indicators 1.4 and 2.1</td>
</tr>
<tr>
<td>kWh or litres of fuel or energy expenses</td>
<td>Ideally: increasing more slowly than m(^3) into supply</td>
</tr>
<tr>
<td>Cash collected/m(^3) into supply (1.4)</td>
<td>Ideally: increasing value of indicator in constant prices</td>
</tr>
<tr>
<td>Cash collected/operating expenses (1.7)</td>
<td>Should be &gt; 1 if operating cash flows are positive and should be increasing over time</td>
</tr>
<tr>
<td>Operating expenses per m(^3) into supply (2.1)</td>
<td>Should be falling at constant prices over time and be less than indicator 1.4.</td>
</tr>
<tr>
<td>Unit energy use (2.2)</td>
<td>Should be falling over time. Technical expertise required to comment on efficiency implications of values</td>
</tr>
</tbody>
</table>
It may be possible to present more detail in terms of breaking down categories of cash collected and expenses, as presented in Table 1.4.6 below.

**Utility with information as “Tier 1” plus income (billings) (“Tier 2”)**

For a tier 2 utility it should be possible to prepare approximate cash flow and income and expenditure statements. Ideally, the statements and indicators should cover the last three years, so that trends can be observed. Table 1.4.4 summarises the items that should, at a minimum, be covered by the assessment in addition to those covered in a tier 1 assessment.

<table>
<thead>
<tr>
<th>Data item and financial indicator</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (billings)</td>
<td>Ideally: increasing in constant prices and increasing (also at constant prices) per connection</td>
</tr>
<tr>
<td>Income/m³ into supply (1.2)</td>
<td>Ideally: increasing value of indicator in constant prices and greater than 2.1 if utility profitable</td>
</tr>
<tr>
<td>Coverage of O&amp;M (1.5)</td>
<td>Ideally: unity or greater and increasing over time</td>
</tr>
<tr>
<td>Profitability (3.1)</td>
<td>Ideally: positive percentage</td>
</tr>
<tr>
<td>Collection ratio (4.3)</td>
<td>Ideally: 90 percent or greater and increasing</td>
</tr>
</tbody>
</table>

As with a tier 1 utility it may be possible to present more detail in terms of breaking down categories of cash collected and expenses as per Table 1.4.6.

**A utility with more comprehensive information**

A utility with more sophisticated reporting arrangements than tier 2 should be in a position to produce the financial statements described in Annex A and a full breakdown of income and expenditure items as shown in table 1.4.6. The assessment may then be extended to most of the indicators in the long list in Table 1.4.2, as shown in Table 1.4.5 below. The two indicators that have been omitted are ROCE and DSCR, as these measures are only relevant to utilities that are using debt finance to expand their systems.

<table>
<thead>
<tr>
<th>Data item and financial indicator</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation charges</td>
<td>No assessment issue, but more whether charges are realistic.</td>
</tr>
<tr>
<td>Water delivered</td>
<td>As with depreciation charges, issue is one of realism – do billed volumes based on meter readings really represent water delivered?</td>
</tr>
<tr>
<td>Current assets</td>
<td>Trade debtors that rise faster than sales are always a concern –&lt;see indicators below.&gt;</td>
</tr>
<tr>
<td>Current liabilities</td>
<td>If trade creditors are increasing significantly and over several years,</td>
</tr>
</tbody>
</table>
may be a sign that there are cash flow problems and utility is “stretching” its suppliers.

<table>
<thead>
<tr>
<th>Data item and financial indicator</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Revenue/m(^3) delivered</td>
<td>Should be consistent with tariffs and should ideally rise in constant prices over time</td>
</tr>
<tr>
<td>1.3 Cash collected/m(^3) delivered</td>
<td>Ideally: increases at constant prices over time</td>
</tr>
<tr>
<td>1.6 Coverage of OM&amp;D</td>
<td>Should increase over time to reach OM&amp;D = 1 (an important cost recovery goal). But do not attach too much value to historic depreciation charges – they are likely to be unrealistically low</td>
</tr>
<tr>
<td>4.1 Current ratio</td>
<td>Should be &gt;1 but do not attach too much importance to this indicator</td>
</tr>
<tr>
<td>4.2 Quick ratio</td>
<td>Should be &gt;1 but do not attach too much importance to this indicator</td>
</tr>
<tr>
<td>4.4 Debt level ratio</td>
<td>No set value, but a stable or falling value is a good result</td>
</tr>
</tbody>
</table>

In some cases, sufficient data may be available to undertake an analysis of creditors and debtors. The tables to enable you to do this are shown in the financial questionnaire under “debtors”, “creditors” and “working capital summary”. Ideally, these tables will generate:

- debt level ratios by customer category;
- collection ratios by category.

Even if the tables cannot be completed, asking questions concerning growth in creditors and debtors may produce some useful qualitative information.

Table 1.4.6 shows a full breakdown of income and expenditure items that may be possible to compile if the utility keeps detailed records.

**Table 1.4.6 Full breakdown of income and expenditure items**

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Currency units</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic water sales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-domestic water sales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New connections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant income (indicate source)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (A)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating expenses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries &amp; wages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other fuel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spare parts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other costs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What kind of immediate improvements can you recommend?

An integral part of the Initial Assessment Report consists of suggesting short-term and medium-term improvements that may improve poor profitability or poor cash flow performance.

Table 1.4.7 below suggests the kind of improvements that could be proposed in this report, depending on the results of the evaluation.

Table 1.4.7 Making improvements

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Likely causes</th>
<th>Possible remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative operating cash flows or low coverage of O&amp;M</td>
<td>Low collection ratio as result of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>disputed bills</td>
<td>Check quality of database</td>
</tr>
<tr>
<td></td>
<td>large users withholding payment</td>
<td>Threaten disconnection, increase penalties for late payment</td>
</tr>
<tr>
<td></td>
<td>collusion between meter readers &amp; customers</td>
<td>Change paths of meter readers; contract out meter reading</td>
</tr>
<tr>
<td>Low billings as result of:</td>
<td>poor database</td>
<td>Check sample of database records</td>
</tr>
<tr>
<td></td>
<td>illegal connections</td>
<td>Offer amnesty and discounted connection charge</td>
</tr>
<tr>
<td></td>
<td>registered connections not billed</td>
<td>Update billing records</td>
</tr>
<tr>
<td></td>
<td>utility is efficient but tariffs are too low</td>
<td>Increase prices</td>
</tr>
<tr>
<td>High operating expenses as result of:</td>
<td>inefficient plant</td>
<td>technical solution</td>
</tr>
<tr>
<td></td>
<td>excessive overtime</td>
<td>restrict overtime opportunities</td>
</tr>
<tr>
<td></td>
<td>high physical losses</td>
<td>manage leakage</td>
</tr>
</tbody>
</table>

Financial management assessment
Financial analysis apart, it is important to understand the financial management systems in the organisation as the overall aim is to institutionalise the process of business planning.

Financial management refers to the following:

- costing systems: whether cost centres have been identified, whether chart of accounts is maintained to capture cost across key cost centres/activities
- budgeting systems: how is budgeting carried out e.g. is this zero based budgeting or is this based on historic trends or is there mere financial forecasting
- treasury management: what is the cash collection process and how does cash actually move? How are payments made? Is there scope for deploying short term surplus funds in low risk/risk free revenue bearing options? Is there a treasury function and if there is how is it managed?
How is financial performance reported?

Financial statements of the sort produced by financial models (such as the TWFM model) are but one of many different types of financial reports as set out in the table below. To the list of conventional reports we have added “project appraisal”, as this is particularly relevant to improving small town water supplies. What we mean by this is a report based on a project level financial model (e.g. the cash flow model (CFM) described in module 1.6) that tells users whether the project is worthwhile in financial terms.

Table 1.4.8  Financial reporting

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Management accounts</td>
<td>Decisions (e.g. prices)</td>
<td>Managers</td>
</tr>
<tr>
<td>Budgets</td>
<td>Control of business; incentives</td>
<td>Budget holders (managers)</td>
</tr>
<tr>
<td>Working capital management</td>
<td>Ensure sufficient cash to run business</td>
<td>Finance director; board</td>
</tr>
<tr>
<td>Financial statements</td>
<td>Record of financial performance, appraisal of future financial viability, possibly with new capital investments</td>
<td>Shareholders, creditors, regulators (&quot;stakeholders&quot;)</td>
</tr>
<tr>
<td>Financing plans</td>
<td>How financing will be raised for investment projects</td>
<td>Investors, management</td>
</tr>
<tr>
<td>Audit (internal or external)</td>
<td>Prevention of fraud; reassurance of investors</td>
<td>Internal: management</td>
</tr>
<tr>
<td>Project appraisal</td>
<td>Make an “in principle” decision on project, subject to financing plan etc</td>
<td>Finance director; board; development bank etc</td>
</tr>
</tbody>
</table>

What are financial statements?

Financial statements are the most publicly accessible form of financial report and are a means of assessing proposals to improve a utility’s performance. Financial statements include:

- the income and expenditure – or profit and loss – statement, showing a company’s trading performance, that is to say a picture of the flows of income and expenditure;
- the cash flow statement, showing how cash is generated and how it is spent;
- the balance sheet, giving a picture of the company’s stocks of assets and liabilities.

All three are linked – you cannot properly understand any one statement without understanding the other two.

The statutory role of financial statements is as a record of past financial assets and flows, but they are also used as a forecasting tool, to form a view of how the enterprise will perform in the future given a certain opening position and assumptions concerning implementation of proposed projects - future billed volumes, labour costs etc etc.
Only the more sophisticated utilities prepare financial statements routinely. In towns where such financial statements are not readily available, it will be up to the consultants/advisors to compile such statements – if they can do so from available data – to feed into the Initial Assessment Report and into the financial model (opening year data).

What does the income and expenditure (or profit and loss) statement show?

The income and expenditure statement shows the utility’s trading position, i.e. whether it is profitable or not. As we are using accruals accounting (revenues and expenses are accounted for as they are earned or spent, not as the money is received or paid out), a business can be profitable and be experiencing a cash flow crisis at the same time.

Table 1.4.9 is taken from the TWSSI model populated by sample data. Financial indicators are shown at the foot of the statement, with reference numbers taken from Table 1.4.2.

Table 1.4.9  Typical income and expenditure statement

<table>
<thead>
<tr>
<th>Run number/description</th>
<th>A4</th>
<th>Villa nova</th>
</tr>
</thead>
<tbody>
<tr>
<td>For financial year ending 30 June</td>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>Units</td>
<td>Current Cr</td>
</tr>
<tr>
<td>Sales of water</td>
<td>Current Cr</td>
<td>1 005 000</td>
</tr>
<tr>
<td>Connection charges</td>
<td>Current Cr</td>
<td>100 000</td>
</tr>
<tr>
<td>Total income</td>
<td>Current Cr</td>
<td>1 311 205 000</td>
</tr>
<tr>
<td><strong>Less</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating expenses</td>
<td>Current Cr</td>
<td>1 149 000 000</td>
</tr>
<tr>
<td>Cost of connections</td>
<td>Current Cr</td>
<td>2 000 000</td>
</tr>
<tr>
<td>Depreciation charges</td>
<td>Current Cr</td>
<td>0</td>
</tr>
<tr>
<td><strong>Equals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating profit (PBIT)</td>
<td>Current Cr</td>
<td>160 205 000</td>
</tr>
<tr>
<td><strong>Less</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax</td>
<td>Current Cr</td>
<td>17 000 000</td>
</tr>
<tr>
<td>Net interest</td>
<td>Current Cr</td>
<td>0</td>
</tr>
<tr>
<td>Bad debts written off</td>
<td>Current Cr</td>
<td>26 212 000</td>
</tr>
<tr>
<td><strong>Equals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net profit/(loss) (=retained profit for year)</td>
<td>Current Cr</td>
<td>116 993 000</td>
</tr>
</tbody>
</table>

Notes

1. **PBIT = profit (or earnings) before interest & tax**

2. Alternative terminology is to refer to nominal (=current) and real (=constant) prices

By way of explanation:

The statement is in current units of currency. This means that the values include inflation. This is conventional for financial statements. The alternative is to use constant prices, e.g. constant 2005 prices, in which case inflation is stripped out of the values presented. The use of constant prices is conventional in financial models used for project appraisal.

Sales of water are essentially the billed amounts for water services for the year and usually represent 90% of a water utility’s income.

Connection charges are treated as income. They are excluded from indicators as (a) they vary from year to year and so can give a misleading picture of trends and (b) they can also be seen as capital contributions towards the costs of fixed assets rather than part of income.)
Other income could be from plumbing services or hiring out of a workshop, for example. As there may be some income from sanitation services we suggest that this is included under this heading. It could include any interest income on cash deposits – although this is often netted off against interest charged.

Operating profit\(^{21}\) is the most commonly quoted measure of profit and is also referred to as profit before interest and tax (PBIT).

Moving from operating to net profit we further deduct

- tax on profit
- interest on debts (i.e. loan interest)
- bad debts written off (i.e. amounts due to the utility which the management has decided it has no realistic chance of ever recovering)

If the utility distributed dividends to shareholders we would see this as a further item to be deducted before showing retained profit for the year. As dividend distribution is unlikely for most small water utilities it is not shown here.

What should you look for? Income should always cover direct expenses and in the longer term should also cover depreciation charges. As depreciation is a non-cash item, it is not important that depreciation charges are covered in the short term. More important than any of this is that the utility has positive operating cash flows (see below).

In the example shown we see:

- high levels of profitability (see indicator 3.1 at the foot of the table);
- depreciation charges\(^{22}\) that suddenly start in 2006 with the addition of new assets – and reduces profits sharply (see coverage of OM&D – indicator 1.6 – dropping in 2006);
- the interest on loan finance, which starts in 2007;
- bad debts as a significant expense.

What does the cash flow statement show?

The cash flow statement shows how cash is generated and how it is spent. Table 1.4.10 shows a fairly typical cash flow statement, using the same sample data set as table 1.4.9.

Table 1.4.10 Typical cash flow statement

---

\(^{21}\) The term “earnings” is a synonym for profit in countries using U.S. terminology

\(^{22}\) Depreciation charges are a frequent source of confusion. They are merely an accountant’s way of allocating the cost of a fixed asset over its useful life and charging it against income year by year. It is a misconception to think that they enable the business to replace its assets, but they are intended to maintain the value of capital in the business – rather than allowing it to be drained away in dividends.
The statement separates operating from investing activities.

Net cash inflow from operating activities is self explanatory. The only point to note is that depreciation charges have to be added as they are a non-cash item that is already included in operating expenses taken from the income and expenditure statement.

The prefinancing cash flow shows cash flows before loans, grants or (not shown here) equity is made available to finance any shortfall. Financing is self-evident – it is the amount drawn annually from each financing source.

Cash available for debt service is an important line. It shows the annual amount of cash remaining after operations and financing that is available to pay the returns to financing, i.e. the amounts due to lenders and (if there were any) providers of equity. After lenders’ debt service has been paid, the residual amount is the increase/(decrease) in cash, which is then added to or deducted from the opening cash balance to give the closing cash balance. The latter goes on to become the cash item in the balance sheet.

What to look out for? The key indicators are:

- a positive operating cash flow (i.e. cash flows from operations before any capital expenditure). In this case initial operating cash flows are negative, as shown by a value of 0.91 for indicator 1.7 at the foot of the income and expenditure statement;

- debt service cover ratio (DSCR) (indicator 4.5), which is cash available for debt service +/debt service expenses in the same year and must be >1 (many lenders insist on a minimum of 1.2). In this case the ratio is not calculated until 2009, the first year in which debt is repaid, when it has a (healthy) value of 2.5.

What does the balance sheet statement show?
The balance sheet is a snapshot of the utility’s stock of assets and liabilities at the balance sheet date. Table 1.4.11 is the balance sheet statement consistent with the income and expenditure and cash flow statements shown above.

Table 1.4.11  Typical balance sheet statement

<table>
<thead>
<tr>
<th>Run number/description</th>
<th>A4</th>
<th>Villa nova</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Net book value of fixed assets</td>
<td>Units Current Cr</td>
<td>-</td>
</tr>
<tr>
<td>Current assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stocks</td>
<td>Current Cr</td>
<td>50 000 000</td>
</tr>
<tr>
<td>Cash</td>
<td>Current Cr</td>
<td>181 185 000</td>
</tr>
<tr>
<td>Total</td>
<td>Current Cr</td>
<td>467 093 000</td>
</tr>
<tr>
<td>Creditors, amounts falling due within one year</td>
<td>Current Cr</td>
<td>150 000 000</td>
</tr>
<tr>
<td>Net current assets</td>
<td>Current Cr</td>
<td>317 093 000</td>
</tr>
<tr>
<td>Total assets less current liabilities</td>
<td>Current Cr</td>
<td>317 093 000</td>
</tr>
<tr>
<td>Creditors due after more than one year</td>
<td>Long term loans</td>
<td>Current Cr</td>
</tr>
<tr>
<td>Net assets</td>
<td>Current Cr</td>
<td>317 093 000</td>
</tr>
</tbody>
</table>

| Shareholders’ funds | P&L account | Current Cr | 216 993 000 | 337 016 959 | 513 652 246 | 713 792 265 | 929 038 424 | 1 191 467 174 |
|                      | Reserves - assets acquired at no cost | Current Cr | 100 100 000 | 100 100 000 | 100 100 000 | 100 100 000 | 100 100 000 | 100 100 000 |
|                      | Reserves - other | Current Cr | - | - | - | - | - | - |
|                      | Shareholders’ funds | Current Cr | 317 093 000 | 437 116 959 | 613 752 246 | 813 892 265 | 1 029 138 424 | 1 291 567 174 |

<table>
<thead>
<tr>
<th>Indicators</th>
<th>run</th>
<th>Current Cr</th>
<th>3,1</th>
<th>3,9</th>
<th>5,1</th>
<th>6,6</th>
<th>8,1</th>
<th>10,1</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2 Quick ratio</td>
<td>run</td>
<td>Ratio</td>
<td>2,8</td>
<td>3,6</td>
<td>4,8</td>
<td>6,3</td>
<td>7,7</td>
<td>9,8</td>
</tr>
<tr>
<td>4.4 Debt level ratio (trade debtors/income)</td>
<td>Percent</td>
<td>18%</td>
<td>31%</td>
<td>41%</td>
<td>43%</td>
<td>45%</td>
<td>47%</td>
<td></td>
</tr>
</tbody>
</table>

By way of explanation:

The *net book value of fixed assets* is, in this case, new assets constructed in 2007-8, net of cumulative depreciation. (An asset is something that is expected to generate income in future time periods and may be *tangible* (a water treatment works) or *intangible* (rights to a new process)).

Current assets are “near cash” and comprise *stocks* (of pipes etc), *cash* and *trade debtors*\(^\text{23}\) (amounts owing by customers – net of bad debts, i.e. amounts deemed irrecoverable). *Creditors* (also known as *current liabilities*\(^\text{24}\)) are amounts owing to suppliers. *Net current assets* (i.e. current assets less current liabilities) are also known as *working capital*.

In this case *creditors falling due after more than 1 year* represent amounts outstanding on long term loans: we can see the outstanding amount declining as the loan is repaid from 2009.

*Net assets* are assets less all liabilities. By definition *net* assets must equal capital (*shareholders’ funds*), as capital = assets – liabilities\(^\text{25}\).

In this simple example, *shareholders’ funds* (i.e. the capital in the business) comprises amounts of net profit from the income and expenditure account.

**What to look out for?** The usual key indicators here are:

---

\(^{23}\) known as *accounts receivable* in countries using US terminology

\(^{24}\) known as *accounts payable* in countries using US terminology

\(^{25}\) sometimes referred to as the *balance sheet equation*
• the current ratio (indicator 4.1, current assets/current liabilities), which should be >1 and in this case is always >3

• the quick ratio (indicator 4.2, (current assets – stock)/current liabilities), always ≤ current ratio, ideally also >1, and in this case >2.8

• the debt level ratio (indicator 4.4, trade debtors/income). In this case the ratio continues to deteriorate (i.e. get larger) as cash collections are never better than 90 percent of billings and revenues grow at less than 10 percent per annum

1.4 (ANNEX) FINANCIAL AND SOCIO-ECONOMIC ASPECTS QUESTIONNAIRE

The purpose of this questionnaire is to support the analysis in Module 1.4a (Understand the Utility – Financial aspects) and Module 1.5 (Understand the market). Note that some of the questions included here would also appear in Module 1.2. (Assess institutional arrangements) because they are relevant to both streams of analysis.

Financial context

Financial autonomy
i. To what extent is the utility financially autonomous? (I.e. in what areas can the utility make its own financial decisions?)

ii. Describe the financial relationship between water and sewerage operations (if any) and the council (e.g. extent of transfers, responsibility for debt service (if any), sharing of staff, premises etc)

iii. Describe rights of ownership and use of water and sewerage assets (e.g. if a separate operator, does it have a licence under which it may use specified assets?). On whose balance sheet do the assets appear?

iv. Are long term loans (if any) guaranteed by the local authority or central government?

v. How does the water and sewerage business deal with any short term cash flow problems? (Eg, short term bank borrowings, transfers from local authority)

vi. Can the utility set the wages of its operating staff? If not, who does?

Accounting systems and financial reporting
i. Which entity is formally charged with reporting (e.g. utility, local authority, local authority’s water department, a separate operator or more than one of these)?

ii. Is the accounting function governed by any act or regulation?

iii. Is the accounting system accruals or cash based?

iv. Is there an accounting manual that specifies accounting policies, procedures, records, formats etc?

v. Is there a chart of accounts?

vi. What kinds of records are held by the utility/municipality? (Cash book, revenue abstract, creditors’ ledger etc)

vii. Are revenue and non-revenue outflows distinguished?

viii. What is the capitalisation policy?

ix. How is depreciation accounted for (if at all)?

x. List the financial reports prepared with their periodicity, details included, whether audited, most recent available

**Financial management**

i. Are cost centres established?

ii. Budgeting: is there a budget cycle? Is it zero based or based on historic trends? Can budget holders be identified? How is progress against budget measured?

iii. Is there a treasury function? How does cash move? Are surplus funds placed in low risk revenue bearing accounts?

**Tariff setting**

i. How are prices set, both formally and informally? Are there any acknowledged principles underlying price setting?
Agreements/contracts
i. Are there any supply or purchase agreements with other villages or towns or enterprises for the supply or purchase of water or the treatment of sewage (or for any other related service)? (Other than the usual utility-customer relationship). If so, can details be obtained?

(Include any multi-village understandings or agreements even if there are no financial transactions)

ii. Are any such agreements currently under negotiation? (E.g. as part of a “clustering” exercise)

iii. Are there any categories of consumer with a legal supply but who are not charged for water or sewerage? (E.g. it is possible that the municipality or military establishments do not receive bills).

Consumer categories and charging

Customer categories and charging categories – see table 1.5.1 in the Understand the Market module.

How are bills prepared:

• by hand or using customer database?
• for metered consumers, by meter reader or back in office?

How are bills settled:

• directly to meter reader?
• only at utility office?
• if not, where else can you pay?
• what forms of payment are accepted (e.g. cash only)

If vendors distribute water from kiosks or springs, state approximate dry and wet season prices charged to end users.

Connection charges

i. Is there a fee for a new connection? If so, please indicate amount

ii. Is there a fee (or perhaps a “deposit”) for a new meter? If so, indicate amount
iii. Does the fee cover the construction cost of the connection? If not, how are the costs of connection recovered?

iv. How are connection fees and connection costs paid? (E.g. can they be paid for in instalments?)

v. Are connections fees or costs subsidised? If so, what are the eligibility criteria?

**Population**

See table 1.2 of the *Understand the Market* module.

**Household income**

i. Any published household income (or expenditure) data should be obtained, even if national. Ideally, data should extend beyond averages to either quantiles (e.g. lowest decile) or to averages for specific household types, e.g. single pensioners or households headed by farm labourers.

ii. Household income data may also be collected via the water user survey (qv).

**Utility income and cash collected**

See tables 1.4 and 1.5 of the *Understand the Market* module.

**Expenditure**

**Physical units**

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005 (budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kWh or litres of diesel/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water: abstraction and treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water: distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (offices etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume into supply (m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

i. Please indicate a representative charge in monetary units per kWh of electricity (excluding VAT) for 2004 and the budget charge assumed for 2005.
ii. Please indicate a representative charge in monetary units per kWh of electricity (excluding VAT) for 2004 and the budget charge assumed for 2005

iii. From which budget are electrical power costs met? From utility income or from central or local government transfers?

### Employees

<table>
<thead>
<tr>
<th>No employees: water service</th>
<th>Average wage/mon</th>
<th>Average additional percentage for incentive or bonus payments</th>
<th>Additional percent for social costs etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management, professional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrators*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technicians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled labourers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled labourers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total/average</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: (a) administrators include accounts staff, meter readers, secretaries et al

i. Are there any bonus or incentive schemes? (If so please give details)

ii. From which budget are employees' costs met (i.e. from utility income or from central or local government transfers?)

iii. Are there any plans to change staffing? If so, please give details:

### Water service operating expenses

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005 budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Currency units x 1 000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries and wages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social costs of labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other fuel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials, spare parts etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes and charges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration (excluding labour costs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Capital charges and bad debts

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005 budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1 000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest expenses (on debt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation charge: water assets&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation charge: sewerage assets&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad debts written off (if any)&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:  
(a) describe bad debts policy  
(b) if possible, split into plant, civil and pipeline assets

Income and expenditure

Water service income and expenditure (or use table 1.4.6 in the Understand the Utility - Financial Aspects module)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005 budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1 000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water service income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other income (give source: )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total income (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water service operating expenditure (B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad debts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation charge (C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest charges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total costs (D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income – expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cash flow

Availability of cash flow statement

i. If not already provided, please provide cash flow statements for 2003-4

Taxation

i. Do sales taxes or VAT affect water and sewerage inputs or outputs? If so, at what rates and are there mechanisms for recovery of input taxes?
ii. As above in respect of capital expenditure

iii. Is any part of the water supply operation liable to corporate taxes? If so, can you indicate (in outline only) how taxable profits are assessed and at what rate(s) they are taxed? Are there any turnover taxes?

**Debtors**

i. At a minimum, try and complete the table below

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Currency units x 1 000</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening trade debtors (households)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing trade debtors (households)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household billings (total in year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening trade debtors (industrial &amp; comm.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing trade debtors (industrial &amp; comm.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial &amp; commercial billings (total for year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening trade debtors (institutional)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing trade debtors (institutional)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional billings (total for year)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Debtors in this table should be gross, i.e. not net of bad debt write offs

ii. Is there any estimate of recoverable arrears? (That is, amounts owed to the utility for a long time that could realistically be collected).

iii. What is the policy towards debtors? Are consumers ever disconnected? If consumers are disconnected, please indicate the number of disconnections in the last twelve months

**Creditors**

i. At a minimum, try and complete the table below

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Currency units x 1 000</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening trade creditors (suppliers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing trade creditors (suppliers)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Opening amounts owing to banks

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Closing amounts owing to banks

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Opening amounts owing to public sector organisations

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Closing amounts owing to public sector organisations

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
(a) specify the nature of the amounts owing (e.g. superannuation fund)
(b) falling due within one year (i.e. overdraft, interest due in year, loan repayment due in year)

---

## Working capital summary

### Opening balance at start of:

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Current assets

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade debtors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash in hand or at bank</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Current liabilities

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to banks within 1 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade creditors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes, charges etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Net current assets (= current assets - current liabilities)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency units x 1,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

## Balance sheet

**Availability** of balance sheet that shows water assets and liabilities:

i. If not already provided, please provide balance sheets for 2003-2004

ii. When were fixed assets last revalued?

## Sources of funds

i. Classify all funding sources (including operational revenue) as follows:
• by whether it is operational or non-operational

• in the case of grants or loans by:
  
  a. their source

  b. whether they are for capital or operational expenditure

  c. whether they are one-off, project specific or for non-specific capital expenditure

  d. their rationale (i.e. their purpose)

ii. Please complete the table overleaf for any water or sewerage loans currently outstanding. Please include any capital grants in this table as well.

iii. Please supply copies of all loan agreements

iv. Please supply copies of any reports to lenders
Long term loans (use same table for any capital grants)

<table>
<thead>
<tr>
<th>Purpose of loan or grant</th>
<th>Lender/donor</th>
<th>Currency of loan or grant</th>
<th>Guarantor, if any</th>
<th>Principal sum at beginning of year</th>
<th>Outstanding at last balance sheet date</th>
<th>Repayment</th>
<th>No of years over which loan repaid</th>
<th>Interest rate</th>
<th>Charges in 2003, Currency x 1000</th>
<th>Charges in 2004, Currency x 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Indicate whether financing is as loan or grant
Investment expenditure

Please complete the table below or provide the information in an attachment. Please identify the actual financing sources used.

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005 (budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment expenditure:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financed by:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government grant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local government grant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral loans</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Multilateral loans (eg World Bank)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bilateral grants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multilateral grants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own resources (retained earnings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Currency units x 1 000
1.5. Understand the Market

This module provides guidance on carrying out an assessment of the market for the utility’s services. The term “market” is used here in a broad sense to include: numbers of people supplied with water, whether or not they have access to a public supply; the categorisation of consumers; consumers’ characteristics (their aspirations, whether they will contribute to the cost of a new connection, their views of current supplies etc); billed volumes (or estimates of delivered volumes in the absence of metering); consumption by consumer category; utility income and cash collected; tariffs.

Module content

- current water consumption as the basis for future water demand forecasts
- consumer charges
- consumer attitudes towards and preferences for water services
- water user questionnaire (complementary to this module)

1.1.1 Introduction and aims

An important component of any business plan is an assessment of the market for the enterprise’s services. This assessment forms part of the initial assessment report, an early step in the creation of a business plan.

This guidance module complements the main guidance manual. It aims to be generic, i.e. equally applicable anywhere.

The term "market" is used here in a broad sense to include:

- numbers of people supplied with water, whether or not they have access to a public supply
- the categorisation of consumers
- consumers’ characteristics (their aspirations, whether they will contribute to the cost of a new connection, their views of current supplies etc)
- billed volumes (or estimates of delivered volumes in the absence of metering)
- consumption by consumer category
- utility income and cash collected
- tariffs

The broad aims are:

- to get a detailed picture of current water consumption as the basis for water demand forecasts
- to get a detailed picture of charges and revenues
- to understand consumer attitudes towards and preferences for water services (what kind of connection – individual, shared, buying from neighbours, buying from a kiosk)
- to be in a position to use the above information to assist planning future services
To do this, consultants/advisors need to:

- compile existing population and water use information
- confer with users to quantify their current use and to get their opinions on existing services and future improvements

### 1.5.2 Links

This module has links to:

- the *initial assessment report* and *short term action plan* (see main guidance manual for contents lists)
- the financial models (CFM and TWFM) that accompany the guidance manual
- module 1.3 (*Understand the Utility – Technical Aspects*), which deals with, amongst other things, projections of future demand

### 1.5.3 Questionnaires

There are two questionnaires that complement this module:

- a financial questionnaire that is intended to elicit most of the financial information required for this module and for the financial baseline assessment submodule (see module 1.4b)
- a water user questionnaire – see section 1.5.10 below

The questionnaires are designed for general use, so far as this is possible, and will therefore require review and, probably, some editing before they can be used in a particular country/regional context.

### 1.5.4 Before we start: what do we mean by income?

Markets generate income. As we are treating the water utility as a business, markets are relevant to the two most important financial statements:

- the *income and expenditure statement* (also known as the *profit and loss account*); and
- the *cash flow statement* (sometime referred to as the *statement of sources and applications of funds*, or the *funds flow statement*).

Both statements tell stakeholders whether the utility is able to pay its way. There are technical differences between the two types of statement: the former is based on billings and expenditure that *should* be made within a reporting period, while the latter records actual cash receipts and payments.

The following are all synonyms for income:

- sales
• turnover
• revenue

but income is not the same as
• cash collected

Income is the amount billed\textsuperscript{26} for the supply of services for a particular period (e.g. a year) \textit{whether or not} cash was received. For example, if I sell 1 000\textsuperscript{3} of water at Sh 1 000 per \textsuperscript{3}, then my income is Sh 1 million, even if I don’t receive a single shilling from customers (who often delay payment for as long as possible). The cash flow statement does show cash collected: the accounting relationship between cash and income is described in the financial performance module.

In the water business, both cash and income are important to give a full representation of the financial wellbeing of the utility. It is important to understand whether values you are given represent cash or income.

\textbf{1.5.5 Describe the consumers}

There are many ways in which consumers can be described:

• by whether they are served at all (some will not receive water, even indirectly, supplied by the utility)
• by how they are charged (fixed fee, per cubic metre etc)
• by where they live
• by their level of service (individual or share connection, hours per day, kiosk, standpipe etc)
• by what they do (commercial, domestic, government offices etc)
• whether they are intermediate or final consumers (a water vendor drawing water from a public supply is an intermediate consumer and his customers are final consumers)

Usually, the categorisation is a compromise between how data are recorded currently and what we would ideally like to know in order to make forecasts. The usual compromise uses categories as follows:

• served and unserved
• activity (households and non-households) – the rationale being that (i) forecasting techniques are different for each of these categories and (ii) some “activities” (e.g. government departments) may be more reluctant payers than others
• how charged: whether on a measured or unmeasured\textsuperscript{27} basis
• by broad service level: usually it is hoped that those dependent on yard taps will get house connections and so on, so it can be helpful to make a service level distinction

\textsuperscript{26} although this will often not be strictly true if charges change substantially near the start or end of a year
\textsuperscript{27} “unmeasured” includes a variety of charging mechanisms discussed in section 1.5.6.
(The locations of illegal connections may be revealed by comparing mapped households and mapped households registered with the utility).

Here we categorise consumers by:

- domestic service type (house connection, yard tap, water kiosk\(^{28}\) etc)
- non-domestic activity (industrial, commercial or institutional)

In some countries there is a problem (for the utility) of illegal abstraction (rather than merely illegal connection), i.e. the unlicensed construction and use of (typically) a borehole to supply several households, a residential block or an industrial site. It may be an understandable reaction to a poor level of service from the utility, but obviously reduces utility income and could increase utility costs. Quantifying and reducing this "captive consumption" would clearly be highly beneficial to the utility, though it is difficult to see how this could be achieved both cost effectively and on any useful scale. Perhaps the best that could be achieved would be a halt to future illegal borehole construction.

### 1.5.6 Consumer charges

**Relevance to the planning process**

Almost all countries levy a specific charge for public water supplies. A wide variety of tariff structures is in use across the world, but there are two generic types:

- charging by the characteristics of the property (for example its floor area or its location, its value for local taxation purposes etc) or the activities of its occupants. An extreme form is a flat charge per property
- charging by the volume drawn from supply, which may be combined with a fixed charge. Volumetric charges may be at a fixed volumetric rate or at rates that increase (and much less often decrease) with the volume drawn over a billing interval – known as rising or falling block tariffs

Put simply, the former is cheap to administer and easy to understand but does nothing to encourage conservation, whereas the latter is much more costly to administer (and of course requires metering – itself a costly exercise) but sends the “right” signals to consumers. This is not the place for a critique of alternative tariff arrangements or of proposals for tariff reform, but there are many sources that the interested reader can consult\(^{29}\).

From the point of view of the DBP, the focus of interest is on:

- the structure and level of existing charges – on average, what proportion of full costs do they recover\(^{30}\)?
- the determination of existing charges – who decides tariffs, how and how often
- whether charges keep pace with inflation

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\(^{28}\) various terms are in use around the world. For example, in Tanzania they are known as DPs (= domestic points), a term used to denote a public tap from which water is sold

\(^{29}\) for example: *Water and Sanitation Tariffs for the Poor, A Guidance Note*, WEDC, 2004

\(^{30}\) this is a performance indicator; performance indicators are covered in module 1.4
• how “affordable” they are to the poorest groups

A table such as 1.5.1 summarises how consumers are charged. From such a table (with other information) we can infer answers to the questions above.

Rising block tariffs

Rising (or, much less commonly, falling) block tariffs are more difficult to deal with analytically than tariffs based on single volumetric rates. Under certain circumstances they are also less equitable and always more difficult to administer. Figure 1.5.1 shows household bills against billed volumes when a simple two block rising tariff is in use. The difficulties with rising block tariffs are that:

• they penalise households sharing a single billed supply, e.g. a shared yard tap
• there is no simple relationship between average household billed consumption and the average household bill; and
• the revenue impact of a change in rising block structure is not easily predicted

In general, a single charge per unit volume is much to be preferred.

In general, a single charge per unit volume is much to be preferred.

Connection charges

Many utilities make a variety of charges for new connections – application fees, deposits, administration fees, charges for a new meter and a contribution towards the costs of the connection from the distribution pipe to the property. High connection costs are often cited by survey respondents as a reason why they have no connection. High charges inevitably lead to a large number of (leaky) illegal connections.

Practical reform of connection charges has to take into account:

• the legitimate right of the utility:
  o only to supply those who are expected to pay for water once they have a supply
  o to recover a proportion of customer related infrastructure costs
  o to ensure a reasonable quality of connection to its distribution pipe

31 It is sometimes suggested that explaining the basis for charges by means of a breakdown may improve acceptance.
• equity between those who have already paid the full fee in the past and those who may enjoy more favourable prices in future

Suggestions for reform are as follows:

• abolish deposits (they are never returned32) and contributions towards increased capacity (as they penalise new consumers for the behaviour of those already connected). Confine charges to (i) a small application fee and (ii) a contribution towards the costs of connection to the distribution main
• occasional and timebound offers of discounted connection charges to persuade those with illegal connections to become legally registered (not least because poor connections to mains are a major source of leaks and contamination)
• if general reductions in charges are considered, make the reduction clearly targeted, e.g. to those prepared to have a shared tap. Otherwise, set connection charges to a uniform level irrespective of the cost involved – there is no reason to penalise those who happen to live further from the distribution main (subject to a general caveat that it is for the utility to decide its distribution zones, given its technical and financial constraints)
• formalised arrangements whereby labour is provided by the householder in return for a price reduction (though given the low price of labour and the need for proper supervision of the connection to the main, the reduction might not be large)
• arrangements that allow payments to be spread or added to bills. (Many utilities already allow some form of instalment plan, which effectively gives credit to customers)
• assertion that the meter belongs to the utility, as consumers who believe that they own the meter will feel justified in removing or tampering with it

Vendors’ charges

Section 1.5.6 deals with charges raised by the utility as they are of most immediate relevance to utility income. However, in some towns only a small proportion of households buy water directly from the utility; most buy it from intermediaries known as water vendors, who themselves fill containers – typically of 20 litres capacity – from public or private standpipes or springs. Vendors charge many times the “official” tariff and often increase prices during dry spells.

Vendors’ charges represent the market price for small quantities of water, reliably delivered and often at a time convenient to the householder. They are relevant to the business planning process as they:

• affect the willingness of those without a public supply to pay for a connection and, similarly, their attitude to monthly bills from the utility
• shed light on the “affordability” question (see sections 1.5.8 and 1.5.11)

Vendors’ prices are best obtained from surveys or focus group discussions (section 1.5.10).

32 The practice of charging deposits can be a reaction to poor collection ratios
### Table 1.5.1 Consumer categories and charging bases

<table>
<thead>
<tr>
<th>Consumer category</th>
<th>Describe the basis for the bill (metered use, monthly fee, property size etc)?</th>
<th>Unit</th>
<th>Min amount(a)</th>
<th>Unit cost at dates in past on which charges changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic: water kiosk operators(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic: yard tap</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Domestic: full in house plumbing(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Industrial</td>
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<td>Commercial</td>
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<tr>
<td>Institutional</td>
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<td></td>
</tr>
</tbody>
</table>

Note:  
(a) for example there may be minimum volume that is charged irrespective of actual consumption  
(b) those with full internal plumbing may not be charged a separate tariff, in which case ignore this category  
(c) this category refers to those selling water from public water kiosks to vendors and/or directly to the public
1.5.7 Population

For the purposes of this section it is assumed that the service area of supply and any sub-service areas (perhaps including peripheral villages) – whether actual or potential – have already been defined.

It is unlikely that the population of the supply or service areas will be known with any accuracy. This does not matter greatly provided:

- the population currently supplied can be estimated with reasonable accuracy; and
- it is possible to establish a satisfactory link between proposed investments (e.g. a new distribution pipe) and additional numbers of people served

Given the uncertainty, it is advisable to arrive at estimates by more than one route, if at all possible. For example, the population currently served can be estimated both from utility statistics and estimates of household size (readily taken from the survey described in 1.5.9 below), as well as from ward level census data. The population dependent on their own supplies, vendors or water kiosks can only be estimated from the social survey.

Table 1.5.2 represents a possible approach to displaying baseline population estimates. The suggested format helps reconciliation between census (or census-derived) data and the “connections plus household size” approach. The actual approach to be followed will be heavily data dependent.

### Table 1.5.2  Population

<table>
<thead>
<tr>
<th>Town/ward/village name</th>
<th>Population from census etc data for town or ward</th>
<th>Principal supply type</th>
<th>No of connections or number of households</th>
<th>Household size</th>
<th>Estimated population directly supplied by this type of supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town</td>
<td>Water kiosk/vendor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yard tap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In house plumbing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals/averages:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village/ward 1</td>
<td>Water kiosk/vendor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yard tap</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>In house plumbing</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Unserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals/averages:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village/ward 2</td>
<td>Water kiosk/vendor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

33 Information to satisfy this requirement can only be collected once the scope of new works has been identified.
<table>
<thead>
<tr>
<th>Town/ward/village name</th>
<th>Population from census etc data for town or ward</th>
<th>Principal supply type</th>
<th>No of connections or number of households</th>
<th>Household size</th>
<th>Estimated population directly supplied by this type of supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yard tap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In house plumbing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unserved</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Totals/averages:**

<table>
<thead>
<tr>
<th>Totals</th>
<th>Water kiosk/vendor</th>
<th>Yard tap</th>
<th>In house plumbing</th>
<th>Unserved</th>
<th></th>
</tr>
</thead>
</table>

**Note:**
(a) describe in the text or in footnotes the basis for the calculation including the source used for household size estimates
(b) unserved in the sense that water is not obtained, either directly or indirectly, from a public supply
(c) in many towns most households buy some water from vendors even if they have a yard tap or internal plumbing

**Population growth rates:** are stable for countries, regions and large towns, but not for individual small towns. Population may of course actually be affected by water supplies in arid or semi-arid regions. The points to note in the TWSSI context are:

- the recent past may be the best guide to a growth rate relevant to a medium term (5 year) intervention
- local authorities sometimes – for good reasons of their own – overstate populations

(Demand forecasting is dealt with in module 1.3).

### 1.5.8 Household income

Self-evidently, the water utility must be able to pay its way – it should be financially sustainable\(^34\). Sustainability means, at least in part, that customers are prepared to settle their bills – they do not find them unduly onerous given the service they receive and the other calls on their household budgets. Thus an assessment of “affordability” is traditionally undertaken. Household income is part of such an assessment. In reality, of course, decisions to spend more on water services do not turn on exceeding some externally prescribed percentage of household income. At best, affordability is a useful cross check on what consumers say they are willing to spend – for example, we would be sceptical if it appeared that households were prepared to devote a third of their income to water.

Ideally we would like estimates of “low” income (for example the average income of the poorest 10 percent or that of a farm or casual labourer or a single pensioner) and average income. Such estimates may be available from national data or may only be gleaned from a household survey. Data obtained are seldom better than of “indicative” quality.

\(^34\) The question of a definition of financial sustainability is left to module 1.4.
It is a piece of conventional wisdom that household expenditure on water and sanitation should not exceed around 4-5 percent of average disposable household income. In practice the very poor often spend a much higher proportion of their (much lower than average) cash income on water services, often being obliged to buy small quantities from vendors (see 1.5.6 above). In South Africa, for example, a limiting figure of about 14 percent is used to assess a household’s ability to pay for water.

1.5.9 Utility income and cash collected

Cash collected

Maximising cash collected is the target for many utilities and small town water utilities are no exception. As a result, it is likely to be a statistic that is readily available.

For a conservative view of today’s collection ratio (i.e. the proportion of a given year’s billings that are rendered as cash within the normal credit period), use the values in the column (2) of table 1.5.4. When considering future feasible improvements, column (3) would be a sensible target for improvements.

Table 1.5.4 Current collection efficiency

<table>
<thead>
<tr>
<th>Consumer category</th>
<th>Percent of current year’s billings actually paid within 3 months</th>
<th>Percent actually collected within 3-12 months of bill being presented</th>
<th>Percent outstanding after 12 months (i.e. the balance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water kiosks⁵⁵</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard taps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In house plumbing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: (a) if kiosks are operated directly by the utility then collection efficiency should be 100 percent

Income and billed volumes

In addition to the financial model input it is a good idea to compile a table showing billed volumes and income over the past three years or so, for two reasons:

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⁵⁵ See for example The Demand for Water in Rural Areas: Determinants and Policy Implications, World Bank Research Observer vol 8 no 1, January 1993
⁵⁶ DFID guidance (Guidance Manual on Water Supply and Sanitation Programmes, DFID, 1998) reports percentages ranging from 0.5% to 10%.
• it is important to reconcile numbers of connections, billed volumes and tariffs with the
formal records of cash collected or income held by the utility – otherwise the forecasts
may not mean very much
• to gain some insight into trends, e.g. whether income has risen in real terms (i.e. faster
than inflation)?

Use a table like 1.5.5. The “other income” item would normally mean the proceeds of such
activities as household plumbing services, hiring out a workshop etc. If there are small-scale
sanitation services (for example emptying septic tanks) then note this and include it under
this heading. “Other income” is usually relatively small (10 percent or less of the total) and
the approach to forecasting it correspondingly simple (for example, assume it remains
constant at today’s prices). Be wary of a situation where “other income” represents a high
proportion of the total. If it does, it either means (i) other income requires more sophisticated
treatment (i.e. the revenue generators need to be understood) or (ii) there are good grounds
to split the “other income” business away from the utility.

If the utility uses cash accounting then substitute “cash collected” for “income” in table 1.5.5.
If cash collected per year and per consumer category is known in addition to income
(billings), then add this item to each category in the table.

Table 1.5.5 Water service volume and income

<table>
<thead>
<tr>
<th>Consumer category</th>
<th>Item</th>
<th>Unit</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water kiosks</td>
<td>No of kiosks in operation*</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume drawn (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yard taps</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private house</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>connections</td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House connections</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal - domestic</strong></td>
<td><strong>Volume billed or drawn</strong></td>
<td><strong>number</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Income to utility</strong></td>
<td><strong>m³/year</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional</td>
<td>No of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed (if known)</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer category</td>
<td>Item</td>
<td>Unit</td>
<td>2002</td>
<td>2003</td>
<td>2004</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Subtotal – non-domestic</td>
<td>Number of accounts</td>
<td>number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume billed or drawn</td>
<td>m³/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Income to utility</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total income</td>
<td></td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total income, water</td>
<td>sales</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from new</td>
<td>connections</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other income</td>
<td></td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total income, all</td>
<td>sources</td>
<td>LCU 000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: (a) the number of kiosks that exist but are not in operation (if any) should also be noted
(b) LCU = local currency unit (rupee, shilling etc)

1.5.10 Consulting the customers

**Approaches**

Client consultation should take place in two stages. First, we need an initial sense of how much households will pay, either for a better connection or for a better supply. This will form part of the initial assessment. Second, when it comes to more concrete proposals for (say) new distribution pipes and connections in a sub-service area, there will need to be a consultation process in each area to confirm that the financial implications of proposals really are acceptable to those who will be asked to pay.

There is an abundant literature on techniques for “client consultation”\(^{37}\), which we do not propose to reproduce here. It cannot be emphasised too much that proper implementation of any of these techniques demands specific skills and can be expensive and time consuming. The choice of the correct approach should be made locally in the light of available resources. Without being prescriptive, our suggested approach is as follows:

- for the initial assessment, use either use focus group discussions or a limited user survey
- for more detailed planning at the sub-service area level, use group discussions

**Focus groups**

Focus group discussions are semi-structured discussions facilitated by skilled professionals. They are relatively fast, cheap and easy provided an experienced facilitator is available, but cannot be used to claim statistically reliable inferences. They are used to explore people’s attitudes and preferences. The aim is to obtain high quality data in a social context. For examples and a full description of techniques, see the *World Bank Participation Sourcebook* (www.worldbank.org/wbi/sourcebook/sbhome.html).

Some tips on focus group management:

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\(^{37}\) See for example *A Review of Techniques for Client Consultation*, World Bank Southern Africa Department, May 1994
• select nearly identical people for each group, the aim being to have people who are comfortable talking to each other (for example, do not, as a rule, mix men and women)
• conduct the discussion in a neutral place, not in company or government buildings
• meet participants’ transport costs, feed them and give each a small gift in return for their participation
• management needs a facilitator to lead the discussion and a note taker. The facilitator asks pre-prepared questions, elaborates where necessary and makes sure everyone has a chance to participate. He or she expresses no opinions of his or her own
• the note taker records the consensus on each question, if achieved, and any interesting individual answers
• if two groups of similar stakeholders reach the same consensus, you can be reasonably sure that the consensus is representative for the entire stakeholder group

Water user surveys

Water user surveys are a way of gleaning a wide variety of information types from users. Provided the sample size is large enough (upwards of several hundred) they allow statistically valid inferences to be drawn. They can be used to elicit:

• how people get water at the moment – whether from the utility or from a non public source
• how much they use and how much they pay
• their view of service quality
• how much they would be willing to pay\footnote{Willingness to pay (WTP) means the maximum amount someone is prepared to pay for a good or service (for the results to be meaningful this means for a service that can be realistically offered to the respondent). Eliciting WTP is achieved using a technique known as the \textit{contingent valuation method} (CVM), a survey technique that puts the idea of a hypothetical market to respondents. For example, the survey persuades respondents that there really is a prospect of a better quality supply but only if the respondent is willing to buy it at a price that is acceptable to the supplier. A more formal CVM questionnaire is available from the WEDC web site (wedc.lboro.ac.uk) – \textit{Willingness to Pay Surveys, a Streamlined Approach}, by Alison Wedgwood and Kevin Sansom.} for an improved service
• how much they would be willing to pay for a connection
• household income
• demographic information

The questionnaire\footnote{The questionnaire is generic and would need careful review before being used in any particular location} compiled by the TWSSI team is an example of a questionnaire that may be used to gather information on:

• customers’ existing water use habits
• customers’ attitudes towards their water supply
• their preferences for improved services
• how much they would be willing to pay for these improved services

The questionnaire \textit{must} be reviewed and amended for local use. Ideally it should also be piloted. If users wish to omit the willingness to pay questions, the section of the questionnaire headed “Paying for a better service in future” can be removed.

User surveys are useful because they:
• return information on market segments (e.g. those living in particular areas) that cannot normally be gathered by more orthodox means
• enable the analyst to estimate parameters that are either not reported formally or reported very badly (water consumption and vendors’ prices are examples)
• report attitudes, opinions and preferences not available elsewhere
• may give an indication of how to price services (see above)

There are drawbacks as well:

• they are time consuming and (therefore) expensive
• interpreting the results requires some care and experience
• unless properly carried out the willingness to pay results may be misleading

Results of consultation

The precise results will depend on the form of consultation adopted. The main guidance manual indicates the reporting that is normally possible. Apart from general lessons concerning billing efficiency, service quality and so on, the important results that should come out of the consultation are:

• the number of households willing to upgrade their connection and an indication of how much they are willing to contribute
• preferences for an improved level of service (but with the same connection as at present) and an indication of how much extra consumers are willing to pay
• (in conjunction with technical considerations described in other modules) appropriate water use assumptions, i.e. how much water users will consume at the price charged

An example

The figure below shows the result of a willingness to pay survey. The sample size was 600 households all of whom already had connections to the public supply. They were asked about their willingness to pay for an improved supply. Specific improvements put to respondents included a reduction in iron content, higher pressures and greater continuity of supply. There was no customer metering: all households paid a fixed monthly charge.

The monthly charge at the time of the survey was G$300 (approx USD2) per month – it is very evident that this “anchors” the responses. 62 percent stated that they were willing to pay more than the current charge for an improved supply. The average willingness to pay on the part of those households interested in improvements was just under G$800 per month – less than 3 percent of household expenditure. In the event a low cost investment programme was devised that would deliver an improved supply at a price consistent with this average willingness to pay, albeit one with less ability to meet peak demands than some regarded as ideal.
Consulting large users

A few large users may dominate the market in a small town. Keeping them is often vital to the utility. Although they present an opportunity, large users can also pose special problems as:

- they can often develop their own supplies at a cost comparable to that faced by the water utility, so if they are unhappy they may simply go elsewhere
- if they delay settlement of invoices or cease trading then they can give rise to a cash flow crisis

It is well worth while analysing trends in their use. Using this information a short questionnaire could be drawn up to find out:

- whether past trends are likely to continue
- whether they supplement public supplies with water from other sources
- how satisfied they are with the quality of supply
- what their future plans are
- whether they propose increasing their use of public water
- whether they settle their water bills promptly

1.5.11 Module outputs

There are five principal outputs from this module, each of which forms part of the baseline assessment. They are:

- the market for water defined by population, taken directly from table 1.5.2
- the market for water defined by income and (if possible) cash collected, taken either from table 1.5.5 or by multiplying the collection ratios from column (2) of table 1.5.4
- an assessment of consumption by consumer category, described in the following section
- household bills and financial sustainability, discussed below
- a sense of willingness to contribute towards the costs of a new connection, discussed below

Baseline consumption assessment

The principal output from this module is an assessment of current consumption. Table 1.5.6 shows how this can be compiled using values estimated earlier in the module.

Table 1.5.6  Baseline consumption assessment

<table>
<thead>
<tr>
<th>Principal supply type</th>
<th>Approaches</th>
<th>Likely range of results in litres per person per day*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unserved by public supply</td>
<td>Market survey</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Those dependent on water kiosks</td>
<td>1) Estimated volume (table 1.5.5) + estimated population (table 1.5.2)</td>
<td>15 – 25</td>
</tr>
<tr>
<td>Shared yard tap</td>
<td>2) Market survey</td>
<td>20 – 40</td>
</tr>
<tr>
<td>Yard tap</td>
<td>3) Previous estimates, e.g. from neighbouring towns, consultants' reports etc</td>
<td>40 – 80</td>
</tr>
<tr>
<td>In house plumbing</td>
<td></td>
<td>80 – 120</td>
</tr>
</tbody>
</table>

Sources: Guidance Manual on Water Supply and Sanitation Programmes, DFID, 1998 and various consultants’ studies in East Africa

A frequency diagram of the sort shown (drawn up for Kisumu, Kenya, in 2003) below gives a good overall picture of consumption and can be used to estimate total consumption.

![Kisumu Domestic Water Consumption Pattern](image-url)
**Household bills, household expenditure and affordability**

In a town where many households get water from public and non-public supplies, *bills* from the utility will often be less than what a household actually *spends* on water.

Average household bills for those with a yard tap or a house connection are readily estimated from tables 1.5.2 and 1.5.5. For those getting substantially all their water from a yard tap or house connection, bills and expenditure will obviously be the same. But for those getting some or all of their water from vendors, expenditure on water can only be estimated from knowledge of:

- prices charged at kiosks or by vendors
- quantities purchased from vendors or kiosks
- the proportion of total consumption bought from vendors or kiosks,

all of which are available from the water user survey or from focus group discussions.

“Affordability” means the percentage of household income represented by expenditure on water – see section 1.5.8. A comprehensive and reliable picture of affordability is unlikely to be possible. In many cases it will only be possible to make statements such as “middle income households in X spend 5 to 8 percent of their income on water; of their total expenditure, half is spent on water provided by vendors”.

However the big message from this part of the baseline assessment is the initial assessment of how much the utility could reasonably charge for its services:

- to new consumers
- to existing consumers for a better service (or indeed for the present service if charges are well below those needed to meet a minimum definition of financial sustainability)

There is no formulaic approach to this. Relevant to it are:

- today’s expenditure on water services, especially by those obliged to buy water from vendors
- views expressed during focus group discussions
- evidence of willingness to pay more from the water user survey, if undertaken
- behaviour of today’s consumers, in particular how quickly they settle their bills (this evidence is gathered during the financial baseline study, described in another module)

**Willingness to pay for a new connection**

The high cost of a new connection is often cited as the principal reason why households remain unconnected (see 1.5.6). How much households *would* be willing to pay is likely to be a significant determinant of plans to expand the system. Thus an initial sense of what would be acceptable is an important part of the baseline assessment. This should emerge from focus group discussions or from the water user survey, but needs to be preceded by a review of the existing policy. If the existing policy appears inappropriate (see “suggestions for reform” under 1.5.6) then, after discussion with the utility, alternatives should be tabled as
part of the focus group discussion before any attempt is made to elicit the maximum people are willing to pay.

1.5.12 Data availability

Table 1.5.7 identifies which data are essential to the business planning process and their likely availability. From the “likely availability” column we see that availability is highly unlikely to be an obstacle to the planning process.

Table 1.5.7 Data availability

<table>
<thead>
<tr>
<th>Data item</th>
<th>Critical to DBP?</th>
<th>Likely availability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumer charges</strong></td>
<td>Utility charges – yes</td>
<td>Utility charges invariably available (from utility)</td>
</tr>
<tr>
<td></td>
<td>Vendors’ charges – yes, but comprehensive picture not essential</td>
<td>Vendors’ charges – certain to be available anecdotally and more comprehensively from water user survey</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>Yes</td>
<td>Some population data certain to be available (from local authority or nationally held). Recent, high quality town level data unlikely to be available. Reasonableness checks using utility knowledge and perhaps aerial photographs a good idea, but wide confidence limits often have to be accepted. Growth rates usually have to be estimated – seldom reliable data.</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td>Not really: nice to know as cross check on willingness to pay increased bills but not absolutely essential</td>
<td>Water user survey only good source – but respondents may refuse to answer!</td>
</tr>
<tr>
<td><strong>Cash collected by utility</strong></td>
<td>Yes</td>
<td>Almost invariably available from utility. Very difficult to progress if utility keeps no records of cash or income.</td>
</tr>
<tr>
<td><strong>Income (billings)</strong></td>
<td>Less important than cash collected.</td>
<td>Small town utilities may not distinguish cash and income – often “cash” is meant even if “income” is the term used. It should be possible to compile at least a year’s worth of billings from the sales ledger.</td>
</tr>
<tr>
<td><strong>Billed volumes</strong></td>
<td>Less important than cash collected.</td>
<td>Poor data quality is inevitable and unavoidable. Will be completely unavailable in absence of customer metering and often unreliable even in large towns with metering. Alternative approach is to use a water balance.</td>
</tr>
<tr>
<td><strong>Willingness to pay for connection or improved service</strong></td>
<td>Estimates of acceptability of price increases and charges that will ensure long term sustainability are essential.</td>
<td>Water user survey or focus groups. It is important to engage customers in the planning process.</td>
</tr>
<tr>
<td><strong>Large user data</strong></td>
<td>Yes – if there are any!</td>
<td>Up to consultants/advisors and utility to approach large users individually.</td>
</tr>
</tbody>
</table>
Town Water Supply and Sanitation Initiative
Volume II

Business Planning for Town Water Services

Module 2
Prepare the Business Plan

2.1a Select an Appropriate Institutional Arrangement

- Independent
- Aggregated

2.1b Select Professional Support Options

- Routine operator + specialist services
- Full service operator

2.2 Draw up Investment, Operation and Financing Plans

Bank Netherlands Water Partnership
Project #043
Town Water Supply and Sanitation Initiative
The World Bank Group
Washington, DC
The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent.
1.1. Institutional and Professional Support Options for Town WSS

Institutional considerations for Town WSS – Independence or Aggregation?

A town that has sufficient capacity to deliver and improve services within its territory may choose to run its services independently of other towns. Other towns may see advantages in pooling resources with nearby towns. This pooling can be either on the demand side (a single administrative structure resulting from a process of “aggregation”) or on the supply side (a single successful operator securing separate contracts with more than one town as an outcome of a process of “market consolidation”).

Before preparing business plans, towns must first decide whether they will be independent or aggregate (see section 2.1.1 on the issues to consider in deciding whether to aggregate). The business plan can then be prepared either by the independent town utility, or by the aggregated business unit. The towns must then (either independently or as an aggregated business unit) decide whether to build in-house capacity, or to outsource. In both cases, either training programmes for in-house staff or outsourcing, the town must consider the options to secure specialist support. These options include Help Desk / Outreach Training, NGO Technical Assistance Providers, APEX project management units, private sector options such as franchising, as well as support from government agencies (see section 2.1.2 for a description of the various professional support models).

Identifying the correct institutional option (independent vs aggregated, in-house vs outsourced) is often an iterative process that requires consideration of a wide range of policy, legal, technical and financial factors (among others), and involvement of a range of actors from local, regional and national levels. The core background information that would be needed to make this decision will have been gathered through the Step 0 and Step 1, as outlined in the Guidance Manual, and the modules for those steps.

This module (Module 2.1) describes (a) how a town might go about aggregating its service delivery function if the decision not to be independent is reached, and (b) the specialist support options which are available either to the independent town or to the aggregated business unit to provide training or outsourced specialist support. Module 3.1 describes the actual process of contracting.
2.1.1. **AGGREGATION: POTENTIAL BENEFITS AND PROCESS**

The purpose of this module is to guide the process of identifying appropriate institutional arrangement for managing the town WSS. The module discusses the process of aggregation in more detail, presents a step-by-step guide to aggregation and describes what aggregated structures might look like.

**Module content**
- Institutional considerations for Town WSS – Independence or Aggregation?
- What is aggregation and how can it help small towns?
- How can an aggregation process be conducted?
- Articles of Association for aggregated structures

### 2.1.1.1 RATIONALE FOR AGGREGATION AS A FORM OF PROFESSIONAL SUPPORT

**What is aggregation?**

A town that has insufficient capacities to deliver and improve water services within its territory may look to group with neighbouring towns. By pooling resources together and increasing their revenue base, the towns can collectively reach a more efficient scale of operation and be able to hire skilled technical and managerial staff. When this process involves the creation of a single administrative structure for the provision of the service, we refer to this as “aggregation”. Those aggregated structures can take many forms:

- They can group two neighbouring municipalities, or several ones in a single region or across a broader territory;
- They can cover the provision of a single service (for example, bulk water supply) or all services, from raw water abstraction to sewerage treatment. For each of these services, aggregated structures may carry out certain operational functions only or be responsible for all operational functions, as well as corporate oversight and regulation functions.

The main benefit of aggregation is that it gives opportunities for improved efficiency of service delivery through economies of scale and scope. Economies of scale would materialize only when the municipalities are sharing a common source or facility, such as a water abstraction point or a wastewater treatment facility. Economies of scope would come out of sharing staff, management systems or specialist service providers between several towns. Indeed, aggregation can also make it easier for contracting a professional operator. Aggregation may be carried out as a first step to reach economies of scale so as to be able to contract a full service operator. Once an aggregated structure is formed, steps for contracting would be pretty much the same as for an individual town. ☰ Module 3.1.

**How does aggregation compare with market consolidation?**

Market consolidation is the process through which a private operator bids and wins several town-level contracts in adjacent towns in order to increase its market share and grows to become a regional player. The end result of aggregation and market consolidation are fairly similar, in the sense that market consolidation also allows reaching economies of scale and
scope. But the means of getting there are very different: whereas aggregation is an institutional process led by the public sector at the municipal level or above (on the “demand side), market consolidation is market-led, within the framework of competition rules.

Ultimately, market consolidation relies on the existence of private sector operators which have sufficient investment and technical capacities to expand their activities in several towns at once. These do not always exist and they may take a long time to develop.

**When should a town consider aggregation?**
Aggregation may be advantageous in a variety of circumstances, although there may be associated obstacles in each case that the town should watch out for.

For example, it may make sense for several towns to share access to a water resource and build a single water treatment facility instead of each of them building separate facilities, which would be more expensive to build and to run. Indeed, administrative boundaries dividing towns and municipalities seldom reflect natural boundaries, and the cheapest way to access water for a town may be to tap the resource available on the territory of a neighboring town rather than for it to dig wells on its own territory for example.

Aggregation may also be particularly advantageous to access financing for new investments, especially for large projects like reservoirs and treatment works which may be shared between towns. The transfer of oversight responsibilities to a higher level can bring other benefits. For example, in reduces oversight costs in individual towns while improving its quality. Contracts can be better managed and environmental standards including control of abstraction can be better controlled.

**What are the potential constraints to be aware of?**
With aggregation, individual towns can lose direct control over investment and management decisions, so a town’s particular priorities may be lost in the collective decision making process. This concern can lead to high transaction costs in reaching consensus on the formation of a single administrative unit to oversee water supply. Also revenues and investments are not necessarily ring fenced within individual towns, so conflicts can arise. This can be exacerbated where high overheads associated with larger administrative units need to be recovered from the aggregated towns. In addition, customers in large towns may object to subsidizing smaller towns, while customers in small towns may complain that larger towns are abusing their dominating position within the aggregated structure to influence its investment strategy and obtain that the majority of investments be made on their own soil.

One main risk of aggregation is that many of the potential benefits may only emerge for a subset of the municipalities that form part of the aggregated structure (the winners from the aggregation process) whilst the potential disadvantages may be more strongly felt by another group of municipalities (the losers). It would therefore be important to compensate the losers adequately (either financially or through other benefits) so that they still remain involved in the process.

### 2.1.1.2 Conducting an Aggregation Process

Aggregation often does not take place or fails because political will is lacking, the potential benefits are not clearly understood, or the process is perceived as too complex. It is therefore important to plan the aggregation process as carefully as possible in advance in order to minimize the risk of failure and to explain clearly potential benefits. A decision tree outlining the
key steps for planning aggregation at town level is in Figure 2.1.1 below. Such process may fail at any stage, because other towns are not interested in aggregating, or the benefits at town level do not seem sufficiently high to outweigh the costs of going through the process, or they cannot agree on the appropriate institutional structure.

If such a voluntary process fails but the higher level of government still sees merits to aggregation because the public benefits outweigh the individual benefits, the latter may try to give incentives for aggregation (usually financial incentives) or even to mandate the process. Aggregation that is mandated by the national government would be considerably simpler to implement because consultation between towns is generally limited. The process would be the same as set out below, starting from Step 4 (implementation).
Figure 2.1.1 Aggregation decision tree

1. Town A examines aggregation as potential option
   - Not attractive
   - Attractive

2. Initiate contact with neighbouring towns
   - Not interested
   - Interested

3. Town consultants assess benefits and costs of alternative aggregated structures
   - Not interested
   - Towns confirm interest

4. Interested towns form a group to drive the aggregation process

5. Interested towns choose form of aggregated structure

6. Group driving the process (and consultants) prepare business plan for aggregated structure

7. Interested towns prepare draft statutes of aggregated structure

---

**No voluntary aggregation**
- Town A to consider other options to build capacity (Module 2.2)
- • Help desk and outreach training
  • NGO technical assistance
  • Contracting

If higher Government sees the benefits of aggregation, may consider ways to drive it from the top
- • Provide financial incentives to aggregated structures
  • Mandated aggregation by law or decree

---

**Voluntary aggregation**
- • Temporary or permanent
- • Choose functions to be aggregated
- • Decide whether to transfer asset ownership
- • Decide whether to transfer staff
- • Decide whether to make tariffs uniform

Follow same process as for Business Planning for a single town as per the Main Guidance Manual, gathering data for all towns and considering contracting options (Step 1 - Step 3)
- • Define entry & exit conditions
  • Allocate voting rights
  • Define rules for allocating costs & sharing revenues
What are the steps in the process?

Figure 2.1.1.1 above shows typical steps that towns would usually need to go through in order to aggregate, detailed further below. However, every aggregation process is unique, building on specific circumstances and characteristics of the water services in each town. Therefore, the actual process will depend on the starting situation, the pace of development, the model of aggregation chosen and other legal, social, cultural, and political factors.

1 – Town A examines aggregation as a potential option

The town in which the business planning exercise is being conducted (“Town A”) may identify aggregation as a potential solution to address problems in Step 1.6. Aggregation would be an attractive option if the town is in the favourable circumstances highlighted above and it is believed that any potential constraints (which need to be mapped out in advance) can be successfully addressed. For example, it may be that the cheaper way of developing additional water is to group with a neighbouring town which happens to have abundant water resources. Alternatively, Town A may have been contacted by another town willing to aggregate or aggregation may be required as part of an overall government initiative. For example, in Tanzania, the new sector law (in draft form) mandates some form of clustering: if adopted, it would lead to some major reform of the market structure for water.

2 – Initiate contacts with neighbouring towns

If “Town A” is driving the process, it would need to contact neighbouring town with which it is looking to group. These may be adjacent towns, or slightly further away, particularly if water resources are available there. Town A’s consultant/advisor can help significantly in carrying out this process as they may be perceived as more “independent”. Target towns should be approached to determine their interest and to identify stakeholder groups that would be affected by, or that could have an influence upon, the aggregation process and the aggregated entity. If none of the neighbouring towns are interested, Town A may need to consider alternative ways to build capacity or solicit support from the Government to mandate aggregation or provide incentives for it. Such “plan B” would need to be considered at any stage of the process, as the risk of failure is relatively high judging by experience.

3- Town consultants/advisors assess benefits and costs of alternative aggregated structures

Town A consultants/advisors can provide assistance in assessing the potential benefits and costs of alternative aggregated structure in order to build the case for aggregation and identify ways of alleviating potential constraints. They should identify the main driver for aggregation, as well as any additional ones so that all the parties have a clear understanding of the purpose of the process. The analysis of drivers and constraints should be done for all towns (as a group) and for each interested town. This process should be as specific as possible, using data (where it exists) on:

- Financial, technical and organizational performance of existing water systems;
- Existing water resources and legal information about water rights;
- Legal models for aggregation available in the country;
- Investment plans, strategies, targets for improving access, etc.
Such information should be readily available for Town A in the form of the Initial Assessment Report (Step 1 Output). The consultants/advisors should aim to carry out a quick analysis of similar data for as many potentially candidate town as possible, before narrowing it down to a “core” set of towns. In-depth analysis of a comparable level of what has been done for Town A in Step 1 would then be required for each candidate town.

If the case for aggregation is very clear from the start (for example, if there are no other alternative than to build a shared water treatment plant), the interested towns may wish to form a group driving the aggregation process straight away (as in step 4 below) and move to a more detailed evaluation of benefits and costs. But if the case is still unclear, the detailed evaluation will need to be carried out up-stream so that towns hesitating to join can confirm (or disconfirm) their interest.

Once the basic information has been collected, it would be useful to frame the analysis in a cost-benefit analysis framework, which will also help identify the most appropriate scale for the aggregated structure and the type of incentive mechanisms needed.

The objective is to determine whether or not, in any given situation, aggregation will be beneficial and, if so, what form of aggregation would bring the greatest benefits. The analysis should examine aggregating at different geographical scales, for different services and types of functions. For example, towns may choose to aggregate only water production but not for water distribution, or they may choose to group together for certain specialist services (such as accountancy) but not for anything else.

Analysis should examine different scenarios “with” or “without” aggregation. It should also seek to cover different boundaries for the benefit assessment: there will be winners and losers within a specific area but if looking at a larger area, there may be a net benefit for the grouping as a whole. Such analysis could consist of two parts: first, a qualitative analysis of costs and benefits, followed by a more detailed quantitative analysis.

**Qualitative analysis.** Some factors can be assessed subjectively using a negative/positive points system for each of the various aggregation options and the “without” scenario, in order to rank those different options. The qualitative assessment may be used to reduce the number of options for which the more complex, quantitative analysis would be undertaken.

**Quantitative analysis.** A quantitative assessment of costs and benefits might consider aspects such as:

**On the benefit side:**
- Improved income from higher tariffs due to raised service delivery and improved billing and collection efficiency;
- Potential for economies of scale (shared premises, management, administration and operational facilities such as warehousing, spares);
- Additional capital works requirements and savings on capital works;
- Economies resulting from reductions in staff numbers;
- Reduction in power charges with lower tariffs (if a large user tariff is available);

**On the cost side:**
- Legal and financial costs of aggregation;
- Costs inherent in the disruption associated with change;
- Costs of effective management information systems;
• Costs of staff training schemes;
• Additional costs relating to redundancies and cost of better-qualified staff;

For every driver and constraint, there are associated benefits and costs that may impact the various stakeholder groups differently. It will therefore be important to tabulate the benefits and costs for each municipality involved. These benefits may or may not materialize, depending upon the starting position of the municipalities and the degree to which they succeed in working together for their best common interests.

The distribution of benefits and costs for each entity for alternative types of grouping should also be conducted, as one of the main constraints of aggregation is often that such benefits and costs are inequitably distributed.

4 – Interested towns form a group to drive the aggregation process

The consultants/advisors should then present their findings to the group of interested towns. On the basis of this analysis, they should confirm or disconfirm interest in pursuing the process. The interested towns should then form a group to drive the aggregation process, which may form an embryonic structure for the future aggregated structure. As noted above, this may take place before the detailed review of costs and benefits, in which case the “driver group” could agree to finance the work of the consultants/advisors to carry out the detailed analysis. In the previous alternative, we assumed that these consultants/advisors would be financed by the central government through an agreement with Town A to support its business planning process.

The objectives of such “driver group” would be:
• To drive the development of the aggregation process;
• To represent the interests of aggregated entities, stakeholders and influential, affected organizations;
• To choose an aggregation model and supervise its implementation.

The driver group should be composed of representatives of the principal entities that will be affected by the aggregation process. Representation of all aggregation candidates, stakeholder groups and organizations exerting an influence on the water service should be considered, although to what extent it will be appropriate for them to be represented will depend on the purpose, extent and nature of the specific aggregation situation. It would be prudent for the driver group not to be chaired by the champion that originated the aggregation idea (such as Town A) so as to avoid suspicions of a “biased process”, although for practical reasons, that is often difficult to achieve.

One of the first tasks of the driver group should be to identify all potential aggregation candidates, stakeholder groups and organizations that could be affected and need to be involved in consultation to design the process. Experience has shown that it is of fundamental importance to a successful aggregation process that the communities or entities considering or undergoing aggregation be convinced of their overall individual benefits of working together. Consultation should be structured to facilitate the process rather than to slow it down. All potential candidate towns should be represented on a single consultation body. Larger, public forums would also be useful to convey progress and to allow the general public to provide feedback, in addition to stakeholder groups.
5 – Interested towns choose form of aggregated structure

On the basis of the estimation of the costs and benefits from alternative aggregation models, the driver group will need to choose the model most appropriate to the circumstances of the group and the general form of the aggregated entity, by answering the following questions:

- Should the aggregated structure be temporary or permanent?
- Which functions should be transferred to the aggregated structure?
- Should asset ownership and staff be transferred to the aggregated structure?
- Should tariffs be set at a uniform level or remain different?

There is a wide range of possible aggregated structures, depending on whether aggregation is temporary or permanent, and on whether the municipalities wish to retain some responsibilities or transfer all functions to the aggregated structure. The report for Phase 1 provides more details on these alternative options and should be referred to for more details.

6- The group driving the process (and their consultants/advisors) prepare Business Plan for aggregated structure

When the driver group has selected the most appropriate aggregated structure, it will need to determine an implementation program and monitor progress against plan. Many aggregation processes fail because the transition to the new aggregated structure is not well thought through, and problems arise at a later stage when they should have been tackled early on in the process. Because disputes are likely to emerge, it is also important to define mechanisms for resolving potential disputes between aggregating entities. This may require intervention from a higher level of government.

In particular, the driver group will need to supervise the preparation of a Business Plan for the aggregated structure. This can be done following a similar process (from Step 2.2) as for a single town.

7 – Interested towns prepare drafts of aggregated structure

To implement the arrangements, the driver group should then draw up the articles of association creating the aggregated structure.

The creation of an aggregated structure would usually require the preparation of a legal document establishing the terms of engagement for towns joining the aggregated structure. This may take various names according to the legal context but we will refer to it as the “Articles of Association” for the aggregated structure.

Such “Articles of Association” would usually define:

- The perimeter of the aggregated structure;
- Functions being transferred;
- Rules of governance and decision-making process;
- Rules setting out the main policies of the aggregated structure;
- Clauses related to the transfer of asset ownership (including water rights) if applicable;
- Clauses related to the transfer of staff;
- Clauses related to the harmonization of service levels and tariffs;
• Entry and exit conditions;

The Articles of Association must contain rules to stabilize the grouping's governance and prevent abrupt and unforeseeable policy changes. They must define precise rules regarding depreciation, accounting, tariff policy, service quality, service extension policy so that these important issues could not be the object of overt political interference. The stability of these rules is vital to ensure service long-term service improvement. It would therefore be suitable that changes in these rules cannot be introduced without a strong majority of the board (e.g. two thirds of the voting rights and two thirds of the municipalities). The Articles of Association should therefore define the minimum quorum for different decisions, making it more difficult to change fundamental policies of the aggregated structure by raising the quorum.

Key choices made in step 5 above would need to be reflected in the statutes of the aggregated structure, specifying governance arrangements or the rules about entry and exit from the aggregated structure. Additional detail on the type of governance arrangements and other institutional issues can be found in the report prepared for Phase 1.
2.1.2. PROFESSIONAL SUPPORT OPTIONS

The purpose of this module is to discuss options for building capacity once an appropriate institutional arrangement has been identified. With respect to the latter, some options for developing a market for professional support providers (consultants/advisors, operators and specialist services providers) are provided. The module is also useful to NGOs, public and private sector organizations, and entrepreneurs that are evaluating opportunities for participating in the town water sector.

The module emphasizes the importance of the business planning approach in establishing a sound basis for attracting professional support providers. It identifies the specific actions that Government can take to develop appropriate materials and tools. Finally, it considers how Government financing can be used to help service providers enter the market, and build towards a more commercial support network.

Reference is made to Modules 0.2 and 3.1: Module 0.2 establishes the operational functions most important for town water supply, and Module 3.1 discusses what to consider in preparing contracts.

Module Content:
- Defining professional support for Town WSS?
- Matching different specialist support options to different sizes of towns
- Three courses of action that Governments should consider
- Building towards a more commercial support network
- The Government’s role with different specialist support options

2.1.2.1 Introduction: Defining professional support for Town WSS?

In Module 0.2 the “operational functions” that are most important in town water supply were established (see Tables 0.2.2 and 0.2.3). For a simple organizational structure common to smaller towns, these functions were set out in terms of four core functional areas: routine operations, business planning, efficiency improvements and expansion.

When considering “professional support”, the key point to keep in mind is that if a town water utility doesn’t have the in-house capability to carry out all its necessary operational functions then it either needs to build that capacity, or to buy it. There are two basic options for securing professional support:

**Routine operator plus separate specialist services**

or

**Full service operator**

The term “routine operator” is taken to mean an operator with basic training who is capable of carrying out routine operations. The term full service operator refers to a more experienced operator, capable of routine operations and specialist services (although the public sector contracting party can choose what functions to delegate to the operator, see Module 3.1).
Towns with a routine operator need periodic support for specialist functions, and even towns with full-service operators can benefit from periodic advice of specialists to review performance and suggest efficiency improvements.

Different towns also require different kinds of support at different stages in their development. The type and timing of advice or technical assistance required by a town depends on its unique situation, i.e. the problems and solutions it has identified, and the interventions it has prioritized, through conducting its business planning process. (These problems / solutions / interventions are discussed in Modules 1.2 to 1.6).

In summary, the kind of support that a town requires will depend on:

- The type and timing of interventions that have been identified, as set out in the business plan.
- How the town chooses to “build” capacity (though training in-house staff) or to “buy” capacity (through outsourcing);
- Whether the town seeks a “full service” operator who can provide most of the necessary routine and specialist services required, or a “local” operator, in which case there will be a need to secure specialist services separately.

### 2.1.2.2 Matching specialist support options to sizes of towns

Table 2.1.1 below shows typical staffing arrangements for different sizes of towns. Table 2.1.2, on the following page, lists the operational functions for two sizes of towns (2,000 to 20,000 population and 20,000 to 50,000 population), and makes a distinction between the level of skill required (routine or specialized) and whether the function is continuous or periodic.  

<table>
<thead>
<tr>
<th>Table 2.1.1 – Typical staffing arrangements for different sizes of towns</th>
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</thead>
<tbody>
<tr>
<td><strong>Size of town</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td>2,000</td>
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<tr>
<td>20,000</td>
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<tr>
<td>50,000</td>
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</tbody>
</table>

*With professional qualifications in business administration.

With reference to these two tables, the following points are noted (size of towns is taken as a proxy for the complexity of operations and the revenue base):

- Smaller towns (2,000 to 10,000 or less population) can support only limited numbers of professional staff. However, the water systems are basic and the specialist functions required are also basic. Routine functions are continuous, but most specialist functions are periodic. Since the full time employment of a manager and large numbers of professional staff is not justified (because operations are simple, specialist support is periodic, and costs must be kept down), the most appropriate solution is a routine

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1 For a more detailed discussion, and for information on larger towns, the reader is referred to the Phase One report prepared by Barry Walton and Colin Schoon: Management and Operation Functions.
operator plus periodic specialist support. Some potential specialist support options are Help Desk / Outreach Training Programmes, NGO Technical Assistance Providers and University Students (see Table 2.1.3 below for a summary of documented specialist support case studies).

- The use of approaches involving aggregation and full service operators need to be carefully considered for smaller towns (2,000 to 10,000 or less population). They may be inappropriate for simple systems that require only periodic specialist support, and where high transaction costs and high overheads may be unaffordable to the towns.
- For towns in the middle range (around a core range of 20,000 to 50,000 population), the operation becomes more complex and more specialist functions are continuous. There will likely still be demand for training and for periodic advice and technical assistance (the Help Desk / OTP and NGO TAP options are still applicable), but the scope has increased for using a full service operator.
- For towns in this core range (20,000 to 50,000 population), as well as some smaller or larger towns, approaches related to full service operators are appropriate. Aggregation is an option, and smaller or larger towns might be part of the aggregated unit (with mechanisms of cross subsidies). Commercial support to operators becomes viable, such as Apex Project Management and Quasi-Franchise arrangements.
- Most towns above 50,000 population can afford to independently contract a full service operator: their operations are complex, they need specialist skills on a continuous basis, and they have an attractive revenue base.

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**University Students as providers of technical assistance:**

University students are often required to complete practical projects under the direction of their professors or write original papers that demonstrate their mastery of a topic. Performing services for small towns could give advanced students interesting and practical experience and would benefit the towns as well. For example, engineering or hydrology students can be recruited by small towns (or assigned by their professors) to help design network expansions and other simple projects, or to identify and write up initial requests for project finance. Students of business administration could help prepare simple financial projections and business plans. Landscape or horticulture students could implement simple landscaping projects. Graduate students in sociology can design and implement simple user surveys. While it may be necessary to pay the students’ expenses, it should be possible to get some of the labor for free or at lower rates than charged by full professionals. Students are most likely to be interested in providing such services in the towns or regions they came from, so personal contacts may be the most effective recruiting tool. Another approach is for a group of town authorities or an association of towns to meet with the heads of key university departments to explore the possibilities. Care must be taken to ensure that the assignments are appropriate to the students’ level of expertise and that those who prepare engineering designs receive adequate supervision.
### Table 2.1.2 – Typical application of skill levels to functions with changing town size

<table>
<thead>
<tr>
<th>Skill type</th>
<th>Skills level</th>
<th>Town population range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2,000 to 20,000</td>
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<tr>
<td>Policy and</td>
<td></td>
<td>□ Approve budgets and</td>
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<td>supervisory</td>
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<td>business plans</td>
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<td></td>
<td></td>
<td>□ Tariff setting</td>
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<td>□ M&amp;E, including</td>
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<td></td>
<td></td>
<td>external audit</td>
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<td></td>
<td></td>
<td>□ Funding applications</td>
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<td></td>
<td></td>
<td>and borrowing</td>
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<td></td>
<td></td>
<td>□ Connections policy</td>
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<td>□ Regulatory reporting</td>
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<tr>
<td></td>
<td></td>
<td>□ Customer demand</td>
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<td></td>
<td></td>
<td>assessments</td>
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<td></td>
<td></td>
<td>□ Expansion planning</td>
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<tr>
<td></td>
<td></td>
<td>□ Financial modeling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Operational</td>
</tr>
<tr>
<td></td>
<td></td>
<td>efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>improvements</td>
</tr>
</tbody>
</table>

#### Specialist

- Customer demand assessments
- Expansion planning
- Financial modeling
- Operational efficiency improvements (performance management)
- Reporting on performance
- IT systems
- Customer information and contracts
- Accounting
- Monitoring (production, water quality, customer satisfaction)
- Customer database
- Stores procurement and control
- Billing and collection

#### Technical and administrative

- Accounting
- Customer records
- Stores
- Monitoring (production, water quality, customer satisfaction)
- Customer database
- Stores procurement and control
- Billing and collection

#### Routine

- Meter reading
- Routine O&M
- House connections
- Record keeping
- Billing and collection
- Meter reading
- Routine O&M
- Connections
Figure 2.1.2: Matching specialist support options to sizes of towns

(the figure matches the dominant option for each zone – in practice some overlap will exist)

- Routine operator plus specialist support
  - Help Desk / OTP
  - NGO TAP
  - Advisors as needed

- Full service operators (serving multiple towns)
  - Help Desk / OTP
  - NGO TAP
  - APEX
  - Quasi-franchise or central support unit
  - Advisors as needed

- Independent large towns with their own full service operators
  - Processes of aggregation and market consolidation will be evident, in addition to independent towns

- Core zone of potential aggregation and market consolidation

<table>
<thead>
<tr>
<th>Size of town (pop)</th>
<th>Size of operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>Routine operator</td>
</tr>
<tr>
<td>20,000</td>
<td>Medium-sized full service operator</td>
</tr>
<tr>
<td>50,000</td>
<td>Regional full service operator</td>
</tr>
</tbody>
</table>
Table 2.1.3: Summary of specialist support case studies

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Outreach Training Systems - Nigeria</th>
<th>NGO TAPs – USA</th>
<th>Apex Project Management – Estonia</th>
<th>Franchising</th>
<th>Regional Associations – Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>• To provide economical, practical, on-the-job training within the trainees’ own workplace, using local private sector experts.</td>
<td>• TA protects federal investments in community infrastructure.</td>
<td>• Investmnet agent for a given municipality - responsible for project planning, design and implementation, and transferring assets on completion.</td>
<td>• Trademark (quality stamp) helps the operator in bidding for contracts and securing financing, and changes the public perception of service provision.</td>
<td>• Umbrella financial / technical support to improve management and maintenance of small schemes.</td>
<td></td>
</tr>
<tr>
<td>• Initially set up by the donor, but in principle beneficiaries contact a Help Desk.</td>
<td>• Ensure compliance with health and safety standards (review, train, disseminate).</td>
<td>• Initially promoted by individual municipalities and funding agencies.</td>
<td>• Driven by commercial interests of franchisor, and Water Board/operator identifying the need for support and/or requiring it to access financing.</td>
<td>• Donor initiatives to protect investments, together with stakeholder consultation.</td>
<td></td>
</tr>
<tr>
<td>Financing</td>
<td>• Requests for TA may come directly from communities or from local government, or through referrals from the state regulatory agency, the offices of the Federal Government (e.g. USDA Rural Development), local engineering firms, and social justice or conservation groups.</td>
<td>• Municipalities buy services at competitive rates.</td>
<td>• Franchise fee: upfront charges cover the costs of training, and ongoing fees as a percentage of revenues.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>• 60 percent by Federal Ministry of Water Resources (i.e., the federal government’s own funds), and 40 per cent by project loan funds (World Bank).</td>
<td>• Financed by (a) federal government as a percentage of loans and grants allocated for community infrastructure, (b) state level grants, or (c) regional grants through Federal Agencies or foundations.</td>
<td>• Project financing from donors (EBRD and NEFCO).</td>
<td>• Upfront charges could be subsidized.</td>
<td>• Ongoing costs to be financed from membership fees.</td>
<td></td>
</tr>
<tr>
<td>• Creation and equipping of the Help Desk office was directly paid for by the FMWR.</td>
<td>• NGOs officially compete for funding.</td>
<td>• NRWA is financed through membership fees.</td>
<td>• Trademark (quality stamp) helps the operator in bidding for contracts and securing financing, and changes the public perception of service provision.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>• FMWR withheld 5 per cent of the project funds allocated to each state to create a dedicated fund.</td>
<td>• RCAP’s services to communities are free, but contingent on eligibility criteria.</td>
<td>• Financial structure: (a) federal government as a percentage of loans and grants allocated for community infrastructure, (b) state level grants, or (c) regional grants through Federal Agencies or foundations.</td>
<td>• Franchise fee: upfront charges cover the costs of training, and ongoing fees as a percentage of revenues.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>• NRWA is financially supported through a dedicated fund.</td>
<td>• NRWA is financially supported through a dedicated fund.</td>
<td>• NRWA is financed through membership fees.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>• Help Desk housed within the Nigeria Water Resources Institute with 5 staff.</td>
<td>• Tripartite support: Federal loans and grants (EPA, USDA, HHS); EPA and NESC training materials; RCAP, EFCN &amp; NRWA TA.</td>
<td>• Municipalities buy services at competitive rates.</td>
<td>• Franchise fee: upfront charges cover the costs of training, and ongoing fees as a percentage of revenues.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>• Town requests transmitted through the state water agency human resources officer.</td>
<td>• RCAP robust apex structure: national Head Office, regional Program Directors, State Directors and field workers.</td>
<td>• Project financing from donors (EBRD and NEFCO).</td>
<td>• Upfront charges could be subsidized.</td>
<td>• Initial project funding from donor (Federal Republic of Austria).</td>
<td></td>
</tr>
<tr>
<td>• Training in the workplace.</td>
<td>• Less important in mature, decentralised sector.</td>
<td>• Independent routine operators, supported by a higher level Franchisor.</td>
<td>• Creates service monopolies.</td>
<td>• General Assembly (two members from each scheme); seven member executive committee; day to day management team.</td>
<td></td>
</tr>
<tr>
<td>Potential barriers</td>
<td>• Mostly grant based.</td>
<td>• Share corporation (municipal owners).</td>
<td>• Independent routine operators, supported by a higher level Franchisor.</td>
<td>• Needs external financing to start up.</td>
<td></td>
</tr>
<tr>
<td>• Lack of stakeholder support for the model.</td>
<td>• Contract awards (programs) for TA may be politically determined.</td>
<td>• Only one office – catering to a small country.</td>
<td>• Creates service monopolies.</td>
<td>• May not draw in external professionals.</td>
<td></td>
</tr>
<tr>
<td>• Locating experts.</td>
<td>• Less important in mature, decentralised sector.</td>
<td>• Top down planning.</td>
<td>• Creates service monopolies.</td>
<td>• Needs external financing to start up.</td>
<td></td>
</tr>
</tbody>
</table>
2.1.2.3 Three courses of action that Government should consider

Most towns need specialist support, but they are often unable or unwilling to pay for the services. The result is an insufficient number of support organizations to serve the sector. How should Governments go about facilitating the development of a market for service providers (consultants/advisors, operators and specialist services providers)? The main challenges appear to be: (i) to create the initial “hook” that links towns and professional support providers, and (ii) to create incentives for towns to advance to a level where they can afford to buy their own support services. There are three courses of action that Governments should consider:

- **Institutionalize business planning** and the “stepped approach” to upgrading town water systems (with reform- or performance-based financing). This point is worth emphasising: business planning (and the “stepped approach”) moves the town towards commercial viability, and makes the case for securing professional support in order to achieve the necessary improvements. This is the purpose of this guide and modules, but it must be noted that business planning is itself an “operational function” as discussed in Module 0.2, and like the other functions it therefore needs to be institutionalized through a professional support arrangement.

- **Specific actions** that Government can take in its role as a facilitator for sector development. This includes development of standard materials, guidelines and software, and establishing mechanisms for benchmarking performance and monitoring water quality (see Box 2.1.1).

- **Provide funding** to help facilitate the initial involvement of consultants/advisors, operators and specialist service providers, (discussed in the next two sections 2.1.2.4 and 2.1.2.5).

From the outset, the governments should review the business and regulatory environment to examine if there are any barriers to adoption of the business planning approach or that discourage the private sector (or the public sector) from engaging in innovative approaches to support towns.

### Box 2.1.1 Specific actions by central / state government that can facilitate development of the market for service providers include:

- Preparation of **standard materials**: e.g. contracts and bidding documents, articles of association for water boards, draft agreements to support aggregation, business planning software, standards for financial reporting and audit.
- **Guidelines**: e.g. on sanitation strategy, connection policy, stakeholder consultation, service agreements, setting tariffs, technical standards (cost effective design and operation), and methodologies to assess demand.
- Development of appropriate **software** to support business and financial modeling, and billing and revenue collection.
- Establishment of an **information clearinghouse** - or **help desk** to promote and ensure easy access to information.
- **Training programs** to train town regulatory and corporate oversight body members.
- Work-based, modular programs to train and certify routine operators, e.g. Outreach Training, NGO Technical Assistance (including “circuit riders”, a technical specialist who can be mobilised to work in towns).
- Promoting the emergence of local private operators that manage and operate services in a number of towns (regionally or nationally) through introductory workshops, continuing education courses, creation of a professional association.
- **Mechanisms for benchmarking** performance, and to monitor water quality.
Timing is crucial. To generate demand for professional support but not to have sufficient service providers available will cripple the results. Similarly, to introduce too many service providers too early in the process and to expect them to compete and survive before a sustainable market is formed and financially viable would also lead to failure. Appropriate timing can be achieved by controlling the application of the business planning approach in towns across the country / state, in parallel with development (and funding) of specialist support options (see section 2.1.2.5).

### 2.1.2.4 Building towards a more commercial support network

As a government determines its strategy for generating professional support providers, one common approach is to subsidize the establishment and administrative overheads of support organizations. This is the principle that underpins the following approaches:

- Financing the work of local consultants/advisors that are assisting towns with business planning (as in the initial application of this Guidance Manual and Modules in pilot studies in Tanzania and Maharashtra, India, and in the Ethiopia Water Supply Project).
- Meeting the administrative and staff costs of a Help Desk to support Outreach Training Programmes (as in Nigeria).
- The use of competitive grants to fund NGO Technical Assistance (as in the USA).
- The hidden costs of support provided to smaller towns from public-sector organizations (as is common in many countries / states, including for example the state institution MJP supporting Municipal Councils in Maharashtra).

Importantly, as the market matures, these organizations and other new entrants will increasingly need to compete for financing and move towards a more commercial basis. As already discussed, this is the goal of the business planning approach with its use of reform and performance based financing to move the utility towards financial viability, where it is able to achieve full cost recovery through its own revenues and borrowing.

### 2.1.2.5 The Government’s role with different specialist support options

The notes below outline the role of Government and challenges faced in developing different approaches to specialist support.

⚠️ For more detailed discussion of the case studies the reader is referred to the original case study reports, which are also referenced below.

**Help Desk / OTP and NGO TAP**

In most small towns, there will be a need to train both managers and operational staff. Experience shows that this can be done most effectively (in terms of cost and impact), if training is "work based", i.e. training is tailored to local needs, and the recipient is able to apply the new knowledge or skills directly to their work.

Two particular methods for providing training and subsidized technical assistance are the Help Desk / Outreach Training Programmes (initially used in Nigeria), and the NGO Technical Assistance Providers model (used for small utilities in the USA).

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3 Volume III report by Stephen Gasteyer: *NGO Technical Assistance Providers in the USA.*
The Help Desk / OTP is based on a central help desk, set up with government support, that maintains a register of local private sector experts, and then helps organize needs-targeted training in the recipients' own work environment. In this model, the Help Desk is likely to be funded by the Government, while the town pays the trainer / service provider directly, and provides them with food and accommodation while they work in the town.

The Help Desk / OTP has a number of advantages when considering a small town programme based on the business planning approach:

- It is a good way to establish a “hook” between towns and basic training or technical assistance.
- The Help Desk / OTP is very compatible with the business planning approach: business planning identifies problems / solutions for individual towns in a systematic way, and this is exactly what is required to maintain momentum of an OTP and identify the training modules and experts needed.
- The OTP courses are competency based, allowing recipients to build their skills over time by taking different modules (it acknowledges a time dimension to capacity building, and allows recipients to work towards becoming certified).
- The approach is not limited to the expertise of hired instructors with fixed overheads – experts are contracted on demand, and overheads are minimal.
- OTP overheads are very low (in Nigeria, a staff of five ran the Help Desk for 250 towns).
- The OTP approach uses only local private sector experts and directly contributes to building capacity in the sector – successful participants can go on to build their business and take on increasing levels of responsibility (e.g. compete for contracts as operators).

There are a number of challenges for Government:

- Mobilizing stakeholder support. The Help Desk / OTP approach requires financing (for the Help Desk, and for trainers’ fees), and training must be needs-targeted (needs must be identified and this demand for services somehow communicated to the Help / Desk). This requires the full commitment of government (e.g. the Ministry, state institutions, local government), as well as representatives of the utilities (e.g. the corporate oversight body, system manager, operator). As already mentioned, the business planning approach provides a mechanism for supporting this information flow and justifying the financing.
- Identifying an appropriate “home” and dedicated staff for the Help Desk.
- Locating private sector experts. The Help Desk must build a registry of experts offering the required services, and work with them to design training modules and deliver them in the work place.

The NGO TAP model is based on a tripartite relationship with: i) a government loans and grants programme, ii) a government funded information Help Desk with training materials and demonstrations, and iii) technical assistance (including immediate assistance with problems through mobile technical officers, called “circuit riders”).

The NGO TAP model is similar in some respects to the OTP model, including the use of a Help Desk and “circuit riders”. However, in its mature form it differs in terms of the scope of services provided and in its administrative scale. The development of the model in the US illustrates this point:
• The US model originated with support to a single community using employees of a local community action project to help organize an non-profit oversight body to receive funding, training and technical assistance.
• The approach was so successful that it was replicated as independent National Water Demonstration Projects around the US.
• Individual projects became so numerous that they were grouped under regional organizations to save administrative and management costs, eventually leading to the emergence of the Rural Community Assistance Program (RCAP).
• Today, RCAP has a national office, six regional offices, and local field representatives in 52 states.
• RCAP tends to work more with communities on planning, financing, administrative management and oversight, while the National Rural Water Association (NRWA – see Box 2.1.2) works with water operators on O&M, and the National Environmental Training Center (NETC) provides a help desk, training materials and demonstrations.

**Box 2.1.2 Regional Associations**

Regional Associations are usually non-profit, membership organizations providing TA to communities that pay membership dues. The model is most often associated with rural communities. For example, in the US, the National Rural Water Association has State Associations that carry out training programs and circuit rider programs (field visits), and development of source water protection plans. In Uganda, the South Western Umbrella of Water and Sanitation (SWUWS) has been set up to provide support to member schemes, based on a similar model in Austria, the Upper Austria Umbrella, which has a history of over 50 years supporting small community schemes with reduced government involvement and cost. SWUWS is governed by a General Assembly, a seven member executive committee, and a management team for day to day activities.

Associations of this kind are set up to help solve problems relating to management and maintenance common to smaller schemes, and which the towns have difficulty solving on their own. A disadvantage of the model, as found in a number of African countries, has been its dependence on donor financial and technical support, and the perception that stand alone associations do not draw in higher-level skills but simply pool the skills of participating communities. Nevertheless, since they need only fund a small technical unit, associations have good potential to achieve substantial cost savings while providing a full range of financial / technical support services needed for management and maintenance of small schemes.

The advantages of using the NGO TAP model when considering a programme of support for small town water supply are:

• The model links towns to a full range of services in addition to operational technical assistance, such as establishing the corporate oversight body, planning, identifying sources of financing, helping to achieve compliance with health, safety or capacity standards, organizing bidding processes for contractors, and facilitating dispute resolution.
• The organizational structure is able to respond to government programmatic objectives, while retaining a focus on local needs: national offices are well positioned to work with the government to define objectives, to support M&E and benchmarking activities, and provide advice to regional offices on reporting requirements for funding; regional offices set the regional work programme, and can report on utility operational performance; and TA providers work directly with the community and tend to live in the area where they work.
• TA is driven by a number of different stakeholders, such as the community, the local government, the funding agencies, and the local private sector. This helps to create networks of professional support, and build capacity in the sector.

• Where there is more than one NGO, the NGOs need to compete for grants to deliver programmes.

• In the USA case study, towns do not have to pay for technical assistance. However, the towns do need to meet certain criteria of low-income status and population. The NGO approach is therefore very good at targeting towns with fewest resources.

This last point is worth noting. Although models like the NGO TAP or Help Desk / OTP have been established with particular ground rules, these are by no means fixed. In particular, improved levels of cost recovery can be adopted. (However, the funding NGOs to support community water supply and sanitation projects may be justified on other grounds: in the USA case study, loans have a default rate of one tenth of one percent since the program started in the 1970s).

The NGO TAP model presents a number of challenges for Government:

• Integrating the grants that support NGOs as a part of a loans and grants programme for town water supply.

• Controlling the growth of administrative and staff costs, including management and hired field staff, while maintaining the objective of helping communities address their needs.

• Establishing appropriate eligibility criteria for towns to receive TA (e.g. differences in the cost of living between areas need to be accounted for).

• Establishing the graduation rules that stipulate when towns must begin to pay the NGO directly for TA services.

Once a town graduates from subsidized TA, the NGO must compete directly with other private sector organizations to provide services to the town.

This last point leads to consideration of pure commercial models as discussed below.

Apex Project Management

Under an Apex Project Management arrangement, in-house capacity of the individual town utilities can be limited to routine operation and maintenance, and more advanced requirements for financing new works, procuring equipment and spares, or responding to major operational failures are contracted to the apex institution.

Under the model as it was developed in Estonia⁴, for example, the apex institution Eesti Veevärk was established as a share corporation to allow it legal autonomy and give it clear rules for governance. It is owned by the individual municipalities (later transferred to the municipalities' water companies) that expect to require its professional services. Municipalities are free to purchase as many shares as are available.

Key elements of the model that can help support a town water programme are:

• The apex institution can have explicit contracts under which it provides its services to individual municipalities.

• In return for its professional specialist services, the apex institution receives a remuneration intended to cover its entire costs of personnel and operations (there is no funding from either local or central government).

• In addition to specialized administrative, financial and technical expertise the apex institution serves as a financial apex borrower through which external financing could be channelled to the municipal borrowers, and as an economical way of buying spare parts and equipment on behalf of its municipal owners.

The challenges that Government must address relate to balancing sustainability of the apex institution versus the need to facilitate market competition:

• The apex institution will come under competition as a service provider, including the supply of equipment and spare parts and with training workshops.
• The apex institution will not be interested in facilitating partnerships and contracts that benefit towns, but rather in making business for itself.

**Private-sector contractors and consultants/advisors, Franchising and Regional Development Agents**

The ideal long-term goal is to have a market balance of demand and supply, with healthy competition among service providers operating on a commercial basis. Individual private sector contractors and consultants/advisors provide competition to all the other specialist support options considered.

**Engineering contractors** have skills required for infrastructure development, and supply and maintenance of equipment such as pumps.

**Specialist engineering and financial consultants/advisors** have skills required for business planning (investment, management and operations, and financing plans), and overall efficiency improvements.

Under traditional contractor/consultant arrangements, the extent of their interest will depend on the profits they can command from service contracts. In this respect, individual towns may be of limited interest to them. It is therefore worth exploring other avenues to bring contractors and consultants into the market. One such option, although still untested in the town water sector, is the concept of franchising and in particular its variant form of “regional development agents”.

**Local Private Companies may manage and operate services** in several towns under multi-town contracts or multiple single-town contracts. The government can promote the emergence of such arrangements by providing training workshops for small private operators and/or asking universities to create continuing education courses and by supporting the creation of a professional association. It can also require towns that receive grants for investment projects to engage private operators.

**Box 2.1.3: Creation of a Private Operators Association in Uganda**

In December 2003, eight private water operators responsible for water supply in 50 urban centers in Uganda agreed to form the Ugandan Association of Private Water Operators, with the objectives of improving the standard of services provided by the operators and generating respect, recognition and support from the public, the government and the country’s development partners.

The association was officially launched in August 2004 with support from the Directorate of Water Development (DWD), German Technical Cooperation (GTZ) and the National Water and Sewerage Cooperation, a public enterprise that provides services in large urban areas. The Association will create opportunities for delivering capacity-building to the emerging private operators, the exchange of experiences among the operators and the pursuit of...
common interests. In November 2004 it published its first newsletter, *the Operator*, and by February 2005, it had organized three training workshops and had submitted grant applications to ACP-EU and the British DED for further activities. On the public relations side, the Association will work to reassure the public that private operators are skilled and reliable professionals who can help local governments to improve the quality and sustainability of water and sanitation services.

Some of the ways in which governments have promoted the emergence and development of local private operators include:

- Interested companies were invited to meetings and workshops on contractual terms and the procurement process.
- Existing professional associations and a water research center developed continuing educational courses.
- A Private Operators Association was formed to promote professionalism and provide training.
- Information about opportunities and contracting procedures was posted on the Ministry’s website.

Under a franchise arrangement, a local independent operator (*franchisee*) receives a “branded” business concept (or package of specialist services) from a *franchisor* in exchange for a fee – effectively making the routine operator to a full service operator. The fees are likely to include an upfront charge (for training), and ongoing payments as a percentage of the operator’s revenues. The driving force behind a pure form of franchise arrangement is the franchisor’s reputational risk (the brand name), and its motive to ensure the ongoing quality of services provided by the franchisee.

Three variations of the franchise arrangement are:

- Master franchise. The franchisor contracts with a master franchisee who then sells the branded business concept to sub unit franchisees, which are otherwise independent of the master franchisee. The master franchisee collects initial fees and on-going payments from sub unit franchisees, and a portion is passed on to the franchisor. It is a three tiered structure.
- Area development franchises. A simplified two tiered structure. An area development franchisee purchases the branded business concept from the franchisor, and then forms its own sub-units, which are part of its own organization.
- Regional development agents. This is a hybrid form of franchising, but perhaps hold the most potential in the town water sector. The regional development agent is contracted by the franchisor to act as an agent on its behalf, to develop a specified area by providing support services to franchisees. The franchisees contract directly with the franchisor. Franchisees pay their fees directly to the franchisor, with a commission or fee passed on to the regional development agent.

The possibilities for franchising and regional development agents (and its potential link to the business planning approach) are illustrated further in the two case study boxes 2.1.4 and 2.1.5 below.
Box 2.1.4 WEDECO, Tanzania: a potential franchise model?

The town of Nzega in Tanzania (population 25,000, 570 connections, 9 kiosks) recently received assistance from a local mining company to rehabilitate its scheme. Since Nzega’s municipal water utility was under-resourced with professional staff and funds to manage and operate the new scheme, it contracted a private operator (WEDECO), an established engineering company in Shinyanga (3-4 hours drive from Nzega).

WEDECO was able to recruit and deploy the necessary professional support (about 15 qualified staff) to operate the scheme, with immediate results in improved services, and allowing the utility to bye-pass the lengthy process of justifying and seeking approval to expand its work-force. Improvements in Nezega include metering, number of connections, leakage control, management of illegal connections, increased hours of service, quantity and quality of water, and some limited increase in coverage.

Another advantage stemmed from WEDECO having the commercial drive to enforce collections from Nzega’s public institutions, again bye-passing possible political intervention had the utility itself attempted this.

WEDECO has a 5 year contract to assist Nzega’s water utility. The commercial arrangements are as follows:

- 11% of revenues are set aside for depreciation.
- Operating costs including staff salaries are then paid.
- Nzega’s utility and WEDECO as the private operator then share the profit in a 70:30 ratio.

WEDECO had used the Nzega experience to explore opportunities to work in other towns such as Igunga, but also recognizes the potential to train other private-sector entrepreneurs to become operators in towns and collect part of the revenues in the form of a performance based royalty.
Box 2.1.5 The role of Regional Development Agents in rolling out Business Planning

Under Phase Two of the TWSSI, the Business Planning approach has been introduced to two small towns in Maharashtra, India. A local consultant team has worked with the towns, with terms of reference to field test the guidance manual and modules, and work with the towns towards the preparation of Business Plans. The question arises, how can the approach be institutionalized to support more towns in the state? The concept of regional development agents (RDAs) offers one such option.

The RDAs would be trained consultants, acting as agents under contract to the State Institution, the MJP. Their initial terms of reference would be to introduce business planning, but this could later be expanded to include other forms of specialist support.

Initially the RDAs would be paid on a fee for service basis. However, overtime the RDAs remuneration would be tied to utility performance. This could include a basic fee (perhaps still from the State) plus bonuses for achieving specified outputs or a share of improved operating cash flows or some proportion of the user fees from the towns (see Module 3.1 for details on options for performance based remuneration).

The RDAs would seek long-lasting relationship with the towns, and support them through progressive change, as the towns improved their performance. Eventually, the RDAs would compete with other specialist services providers to support the towns.

Some of the advantages of this model are:

- It provides a natural link between using consultants contracted under small scale pilots to an expanded town water supply programme.
- The State Institution could recruit and train potential RDAs to cover the full range of Business Planning topics covered by these modules.
- The State Institution could control the quality of the RDA’s through a form of accreditation or certification process.
- Town Utilities would benefit from a formal agreement that linked the business planning approach (and reform and performance based financing) with professional support.
- Towns would have the opportunity to ‘procure’ professional support from any certified RDA thereby applying commercial and market pressures for optimal performance by the RDAs.

As illustrated in figure 2.1.2, each of the specialist support options discussed in the module has a potential niche in the town water market. In most countries, more than one approach will be needed to serve the sector.
The purpose of this module is to give advice on the drawing up of investment, financing and operations plans, and preparation of the business plan.

Preparing investment, financing and operations plans is an iterative process. It requires short-listed prioritized investments, confirmation that matching funds are available and assessment of the impact on operations (and operational expenses). Financial modeling is required to ensure the utility is expected to be viable once plans have been implemented, before finalizing the investment and financing plans. The main output from Step 2 is the actual business plan, which includes an executive summary, a statement of goals, a description of the utility and the market, a summary of the town utility’s strategy and its investment, financing and operations plans, details of financial forecasts, and a communication plan.

Module content
- Definition and example of an investment plan
- The iterative nature of drawing up an investment plan
- Definition and example of a financing plan
- Impact of limited budget size on financing plans
- Definition of an operations plan
- Producing step 2 output – the Business Plan

2.2.1 INVESTMENT PLANNING

What is an investment plan?

An investment plan is a prioritized list of investments for which the utility is able to secure finance and is consistent with viable operations. There is thus an iterative relationship with the financing plan (see 2.2.2) and the operations plan (see 2.2.4) which in turn have iterative relationships with financial modeling (see 1.6) and operational expenses (see 1.3 and 1.4). Typically, a distinction is made between a short term investment plan, stretching over 2-5 years, and a long term investment plan. Here, we are referring to a short term plan.

The iterative process is illustrated in figure 2.2.1 overleaf.
Figure 2.2.1 Process for drawing up an investment plan

1. **Long list of interventions**
   - **Investment plan** = short list of prioritized interventions

2. **Provisional budget**:
   - Retained earnings + town grant
   - Government grant + debt

3. **Operational impacts**

4. **Run TWFM financial model**

5. **Is utility viable?**
   - **Yes** → **Finalize investment & financing plan**
   - **No** → **Change short list of financing split in budget** (Revise) operations plan

6. **Investment plan** = short list of prioritized interventions

7. **Financing plan** = consistent with budget

8. **Operational impacts**

9. **Run TWFM financial model**

10. **Is utility viable?**
    - **Yes** → **Finalize investment & financing plan**
    - **No** → **Change short list of financing split in budget** (Revise) operations plan
Compiling an investment plan is a fairly straightforward exercise once prioritization is complete (Module 1.6). The main issue is that of adjustment of base costs, i.e. costs of engineering works at constant prices, for design and supervision costs and then for physical and price contingencies (see the definitions below) and for design and supervision costs.

**Physical contingencies** are amounts allowed for, for example, design changes or ground conditions that are worse than expected. **Price contingencies** allow for inflation, financing charges during construction and exchange rate movements – it is always a good idea to specify exactly what is included in any statement of price contingencies (in the example below, for example, financing charges – front end fees and interest during construction – are itemized separately rather than being included in price contingencies). Some financing institutions place limits on the level of contingencies they will tolerate.

The amount of this adjustment should not be underestimated: even in a low inflation environment, base costs may have to be increased by 30 percent to include all contingencies. It is these adjusted costs that must be matched by the available funds as shown in the financing plan.

Table 2.2.1 shows the way in which a summary investment plan in base costs is brought to the point where it can be put alongside a financing plan. (The adjustment of base costs is shown in the rows below the subtotal of base costs, which reflect 2004 prices). In this case contingencies add 29 percent to the base cost (i.e. 1,332 less 1,033 divided by 1,033). It is important to note that the financing plan is already implicit in this table: the front end fee and interest during construction (IDC) depend on the proportion of debt in the financing plan and the terms of that debt.

**Table 2.2.1 Investment plan summary**

<table>
<thead>
<tr>
<th>Water development project</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base cost (2004 prices)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil works</td>
<td>0.0</td>
<td>112.5</td>
<td>112.5</td>
<td>0.0</td>
<td>225.0</td>
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<td>Plant</td>
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<td>31.5</td>
<td>53.5</td>
<td>0.0</td>
<td>85.0</td>
</tr>
<tr>
<td>Pipelines</td>
<td>0.0</td>
<td>250.0</td>
<td>375.0</td>
<td>0.0</td>
<td>625.0</td>
</tr>
<tr>
<td>Overheads</td>
<td>0.0</td>
<td>24.0</td>
<td>3.0</td>
<td>0.0</td>
<td>27.0</td>
</tr>
<tr>
<td>Design, supervision etc</td>
<td>0.0</td>
<td>40.2</td>
<td>30.2</td>
<td>0.0</td>
<td>70.4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0.9</td>
<td>458.2</td>
<td>574.2</td>
<td>0.0</td>
<td>1,033.3</td>
</tr>
<tr>
<td>Contingencies:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>physical</td>
<td>0.0</td>
<td>51.4</td>
<td>63.0</td>
<td>0.0</td>
<td>114.5</td>
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<tr>
<td>price</td>
<td>0.0</td>
<td>52.2</td>
<td>100.4</td>
<td>0.0</td>
<td>152.7</td>
</tr>
<tr>
<td>IDC (foreign)</td>
<td>0.0</td>
<td>2.3</td>
<td>4.3</td>
<td>0.0</td>
<td>6.6</td>
</tr>
<tr>
<td>IDC (domestic)</td>
<td>0.0</td>
<td>7.7</td>
<td>17.3</td>
<td>0.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Total at current prices</td>
<td>0.9</td>
<td>571.9</td>
<td>759.3</td>
<td>0.0</td>
<td>1,332.0</td>
</tr>
</tbody>
</table>

Notes: (a) front end fees are payable to lenders
(b) physical contingencies reflect uncertainties arising from ground conditions etc
(c) price contingencies reflect inflation: 5% pa on domestic and 2% pa on foreign costs in this example
(d) IDC = interest during construction on foreign and domestic loans
2.2.2 Financing plans

A financing plan shows, quite simply, how the investment plan is to be financed. Funding bodies have their own preferences for the layout of a financing plan. At a minimum, the plan will show, for every year, expenditure and a matching amount by financing source. In some cases financing of every item is not split between financing sources, rather certain items are entirely financed by one institution (“parallel co-financing”).

The table below shows a simple financing plan corresponding to table 2.2.1. In this case there are both foreign and domestic lenders and two public sector agencies financing the project. Note that in this instance the foreign lender’s initial fees are to be met in advance by central and local government.

<table>
<thead>
<tr>
<th>Year</th>
<th>IFI loan</th>
<th>Domestic loan</th>
<th>Central government</th>
<th>Local government</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs million</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>0.0</td>
<td>0.2</td>
<td>0.7</td>
<td>0.9</td>
</tr>
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<tr>
<td>2007</td>
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<td>166.7</td>
<td>171.0</td>
<td>371.6</td>
<td>759.3</td>
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<tr>
<td>Total</td>
<td>90.0</td>
<td>300.0</td>
<td>300.0</td>
<td>642.0</td>
<td>1,332.0</td>
</tr>
</tbody>
</table>

| Percent | 6.8% | 22.5% | 22.5% | 48.2% | 100.0% |

The financing and investment plans reached at this stage are in reality drafts. Stages on the way to final costs will usually include:

- an engineer’s estimate (the basis for the draft plans just described)
- tender prices
- the final (probably negotiated) price with the successful tenderer
- any provisional items released during construction
- settlement of claims (if allowed under the contract), for example, over ground conditions being worse than the contractor was led to expect
- release of retention money at the end of the contract, i.e. money held until construction is considered complete

This means that the financing plan has to specify a way in which these extra amounts will be financed. Typically, of course, they will fall to the beneficiary’s account. It may be necessary for the beneficiary to demonstrate that a cost overrun could be funded, ultimately of course from increased prices but in the short term from cash reserves or from a debt facility.

From the financing plan it is possible to calculate the weighted average cost of capital (WACC) of the financing, which should of course be less than the internal rate of return on the project investment.

---

5 a provisional item is work which may become necessary but only if specified conditions are met
2.2.3 FINANCING PLANS - THE INFLUENCE OF BUDGET CONSTRAINTS

What happens if capital budgets are increased?
There is often an understandable temptation to maximize grant financed capital budgets, as capital grants are usually seen as a once and for all event. In this section we look at the effects of increases in capital program size.

The diagram makes what is in reality a simple point, namely that more fixed assets are not a "free lunch". Even if there is no loan co-finance to increase debt service expenses, there will be additional maintenance and operation expenses and a larger capital maintenance liability.
### 2.2.4 OPERATIONS PLANS

The purpose of operations plans is to itemize, set a timetable for and quantify the outputs of those operational changes that will have an impact on the utility’s financial viability. The potential scope is wide. It could reflect:

- engagement of professional support
- expected improvements in efficiency (energy, materials, procurement costs etc.)
- changes to staffing, including managers, professional staff and workers
- operating implications of the investment plan (e.g. changed energy requirements of new plant)
- new procedures for registration of customers, billing and cash collection

The operations plan has to be linked to the investment plan and to prioritized measures that do not rely on fixed asset investments (i.e. represent “quick wins”) – see module 1.6. There will also be links between output indicators in the operations plan and those listed in the monitoring and evaluation framework (module 3.3). There may also be links to lenders’ loan agreements, which sometimes specify reform of management or professional support arrangements, or operating cost reductions.

There is no generally agreed framework for setting out an operations plan. For each proposed operational change the plan should specify:

- the proposed intervention (e.g. improving pumping efficiency by replacing a pump and motor)
- its intended output (e.g. reducing average energy use by 10,000 kWh per year)
- the expected change in operating expenses and the timing of the change
- the link to the investment plan (to some specified capital item in the plan)
- a costed proposal to secure new skills either through in house training or through outsourcing

### 2.2.5 PRODUCING STEP 2 OUTPUT – THE BUSINESS PLAN

A proposed outline for the business plan is presented in Table 2.2.3 below, and is followed by additional details about what should be laid out in each section of the business plan.

**Table 2.2.3 - Business Plan Outline**

<table>
<thead>
<tr>
<th>BP S#</th>
<th>BUSINESS PLAN - SECTION TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>EXECUTIVE SUMMARY</td>
</tr>
<tr>
<td>II</td>
<td>STATEMENT OF GOALS</td>
</tr>
<tr>
<td>III</td>
<td>DESCRIPTION OF THE UTILITY AND MARKET ENVIRONMENT</td>
</tr>
<tr>
<td>IV</td>
<td>TOWN UTILITY’S STRATEGY</td>
</tr>
<tr>
<td>V</td>
<td>INVESTMENT AND FINANCING PLANS</td>
</tr>
<tr>
<td>VI</td>
<td>OPERATIONS PLAN</td>
</tr>
</tbody>
</table>
Section I - Executive summary

The Executive Summary should provide a readable, credible, brief overview of the business plan. The executive summary may be the most important tool for setting out the main objectives of the utility as per its business plan for all stakeholders. A further objective of the executive summary is to motivate the reader to review the document in its entirety and to understand its message.

**LOOK OUT!**

Although this is the first section of the business plan, it will be easier to write it last because it serves as a concise overview of the document, highlighting the key points from the completed business plan. The tone of the business plan should be positive and compelling.

Section II - Statement of Goals

The mission statement should state succinctly
- What the utility is trying to accomplish;
- What critical issues it is facing;
- The benefits to the community of potential improvements, including meeting the community’s water needs and retention or creation of jobs.

Section III - Description of the utility and the market environment

This section will summarise the main points coming out of the Initial Assessment Report (Sections 1.2. to 1.5), adapted if additional information has been gathered after finalising the IAR. The section provides information on what the utility’s current situation and main constraints are, without repeating the detail contained in the IAR. It should contain all necessary “contextual” information to support the presentation of the strategy.

Section IV – Town utility’s strategy

This part of the business plan should set out how the town utility is planning to deliver the goals in its statement of goals. It should:
- Clearly state where the utility should stand at the end of the period covered in this business plan (recommended period: 5 years);
- Identify the principal barriers to successfully achieving this vision;
- Identify the internal resources needed and internal deficiencies that must be overcome in order to achieve success (infrastructure limitations, skill-sets, personnel);
- List any external events or situations that may affect the utility’s ability to achieve its objective (e.g. legislation, regulation, economy);
- List the prioritized challenges or problems the utility is currently looking to address;
- Describe the benefit that should be realized once the problems have been solved.

It would be useful to summarize this section by developing a chart or table that lists:
- The chosen objectives;
- The most important tasks to accomplish the objectives;
- The milestone measures used to evaluate the completion of the tasks;
- Who will be responsible for achieving the goals;
• The nature of the status report that indicates the progress of the tasks, and how the reports will be used to communicate to all involved;
• Contingency plans.

The next sections in the business plan will provide additional details on how each component of the strategy can be carried out in each key area, including investments, operations and financing. As much as possible, each of these sections should seek to:
• List the tasks that must be accomplished in order to achieve the objectives;
• List how the progress of the tasks will be measured and monitored in order to create specific task related goals;
• Describe all internal or external resources that must be secured to accomplish the tasks in order the reach the goals;
• List the risks associated with the tasks to accomplish the objectives, and any actions that can be taken to minimize or avoid these risks.

Section V - Investment and financing plans

An investment plan is a prioritized list of investments for which the utility is able to secure finance. This section will set out the investments that the utility is intending to carry out in the next period, including the type of investments, the costs (including physical and price contingencies as well as design and supervision costs) and the planned schedule for carrying out such investments and maintaining them. This will be the result of a process of prioritization, as conducted in Steps 1.6 and 2.2. and will take account of the self-financing capacity of the utility or availability of external finance. A financing plan shows how the investment plan is to be financed. Funding bodies have their own preferences for the layout of a financing plan. At a minimum, the plan will show, for every year, expenditure and a matching amount by financing source. In some cases financing of every item is not split between financing sources, rather certain items are entirely financed by one institution (“parallel co-financing”).

LOOK OUT! HOW MUCH DETAIL SHOULD YOU PROVIDE?
Whilst it may be useful to report on the prioritization process and especially on the options that were considered but later discarded, it would be preferable to confine such analysis to an annex so as not to over-burden the reader and to ensure that what appears clearly is what the utility is committing to doing and how it proposes to finance it, rather than what it has decided against doing.

Section VI – Operations plan

The Operations plan will lay out how the utility intends to manage and operate its facilities, given the planned investments and the proposed improvements in operational efficiency. It will lay out a number of performance indicators against which improvements in technical and financial operational performance can be charted over the business plan period (see Module 3.3. for a discussion of the type of analysis that may be used).

If the utility chose to rely on external professional support, it will indicate what type of professional support options will be relied upon, how the contracts will be drafted, issued and monitored. The operations plan will also lay out the core skills to be maintained at the level of the utility, and how it intends to develop and retain such skills (by including a training plan if applicable). The operations plan should also define the systems and reports that will be needed, and provide details of any computer hardware and software, for example for improved billing and customer information systems.

Finally, the operations plan should focus on how revenues are going to be generated, including sales forecasts, descriptions of any credit policies or details of payments by instalments where appropriate, for example with new connections.
If some “quick-wins” have been identified, i.e. some measures that can yield improvements in operational efficiency at a relatively low cost, the operations plan should include a clear programme for introducing those measures and allocate responsibilities within the utility for doing so. For example, some measures can be taken to make the process of selling water and collecting cash more efficient with little outlay. This could involve:

- Maintaining the good (paying) existing customers in each segment;
- Increasing sales to existing customers;
- Ensuring that billing to existing customers is comprehensive and accurate;
- Efficiently and honestly collecting cash from customers;
- Extending service to new customers within prioritized segments.

**LOOK OUT!**

It would be useful to report any quickly implemented change used to address a small problem discovered during the business planning process. Illustrating such actions with reported or expected results would demonstrate willingness to introduce change and convince stakeholders that it is possible.

**Section VII – Financial forecasts**

The business plan should contain a set of financial forecasts against which future performance will be judged. The TWFM is an appropriate tool for producing such forecasts. Main assumptions should be set out. It may be sensible to include more than one scenario, e.g. high, medium and low demand growth, or with and without delivery of a proposed capital project.

**LOOK OUT! BE REALISTIC ABOUT FINANCIAL PROJECTIONS**

The key in preparing these financial forecasts is to be realistic. Users of the plan must find them convincing. It may be helpful to compare financial performance targets with achievements at other similar water utilities.

**Section VIII - Communications plan**

If possible, it would be helpful to include a Communications plan to deliver the ‘correct message’ to the different market segments.

This could take the form of simply preparing brochures or one-page information sheets that could describe the utility’s new approach or more specific issues such as:

- When certain goals are planned to be achieved;
- Any planned increase in tariffs, stating why such tariff increases are necessary and what service improvements customers can expect to receive and by when;
- Specific measures impacting customers such as installation of meters, stating when the installation will start, when it is expected to be completed and the anticipated benefit(s);

Within the communications plan, there are advantages in deciding when to use the press or to organize meetings with presentations to explain specific points of the overall strategy. Reference to such approaches in the business plan can build the confidence in the reader that any sensitive issues (thereby risk) have been considered.

**LOOK OUT! WHAT SUPPORTING DOCUMENTS SHOULD YOU SUBMIT?**

Business plans submitted to financiers in a private sector context would generally contain supporting documentation. In the case of a town utility, it may not be necessary to attach those documents so as to keep the business plan lean, but the business planning process should provide a good opportunity to organise the town utility’s key records so as to make them easier to find in future, such as:

- Legal documents for the utility’s initial registration and formation.
- Legal documents showing its present legal status.
• Maps of location and service areas
• Copies of any leases or contracts with external operators
• Organizational chart with relevant résumé’s
• Asset inventory, descriptions of assets and documents related to any liabilities
• Records showing past performances
• Financial statements

LOOK OUT! WHAT IS TO BE DONE AFTER THE BUSINESS PLAN IS WRITTEN?
The following aspects should be reviewed:
• Is the document complete? Are all the sections present?
• Should any additional supporting documents be included?
• Is it too long or too short?
• Are some sections too beefy and others too thin creating an imbalance?
• Is the content succinct?
• If written by different authors, has it been edited to provide continuous style?
• Is it understandable: does it flow, is it easy to understand?
• Is it well formatted?
• Is the message clear, positive and focused for the targeted audience?
• Is the business plan compelling?
Town Water Supply and Sanitation Initiative
Volume II

Business Planning for Town Water Services

Module 3
Formalize relationships and implement arrangements

Bank Netherlands Water Partnership
Project #043
Town Water Supply and Sanitation Initiative
The World Bank Group
Washington, DC
3.1 CONTRACTING OPERATORS OR SPECIALIST SERVICE PROVIDERS

The purpose of this module is to guide the corporate oversight body (e.g. a water committee, or autonomous town water board) in preparing contracts to secure services from operators and/or specialist service providers. The module provides guidance on: (i) preparing a list of services to be provided and identifying the expected outputs and performance standards to be achieved; (ii) examining the risks and selecting a method of remuneration; and (iii) preparing an incentive compensation table which specifies the payments or bonuses that will be paid for achieving various levels of performance. The module is based on the principle that contracts are a tool for achieving the objectives defined in the business plan.

Module content
- Understand the link between the contract and the business plan,
- Identify the services and outputs to be provided by the operator,
- Examine risks faced by both parties,
- Identify a suitable method of remuneration for the operator and, if applicable,
- Prepare an incentive compensation table that links payments with outputs.

This module shows how the business planning process set out in the Guidance Manual shapes contracts with service providers that the utility may chose to hire to provide services on a full time or part time basis. During the business planning process\(^1\), the local decision makers will have identified the current problems that confront them, prioritized necessary interventions and prepared investment, operation and financing plans. They will have identified functions to be performed in-house, and outlined the support required for those functions. They will also have decided which functions to outsource, and how best to do so (e.g. full time or part time). With this information they will be in a position to prepare and award contracts for services that they choose to outsource and to establish the procedures and capacity for monitoring performance.

Rather than refer to specific operator contract types such as management contracts, lease contracts and concessions, the approach adopted here is to conceptualise a number of contracts with a routine operator and specialist service providers. It is anticipated that the operator contract will evolve over time, such that the initial contract will have limited risks and responsibilities (for example, managing routine operations with responsibility to pay for most day-to-day inputs but not for replacements, expansions and new investments) but with mechanisms for gradually transferring more risk and responsibility to the operator as the information base improves and the level of trust between the contracting parties builds up. This will be reflected not only in the increasing delegation of functions to the operator over time, but also in the method of remuneration, e.g. in moving from a fixed monthly fee plus bonuses for good performance to a share of revenues.

The services to be provided under each of the contracts awarded and the performance standards expected over a given period of years will be specified in a list of services, performance standards table, and incentive compensation table. Each contract and the operator / specialist service provider’s performance will be reviewed annually as part of the on-going business planning process. Over time it may be desirable to revise a contract to make corrections or reflect changes in the business plan. In order to allow for some flexibility while

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\(^1\) The planning process is not a one time event but is continually repeated in order to identify current problems and prepare updated plans.
protecting both parties, it is important that the initial contract has a sound legal basis in which the rights and obligations of each party (the corporate oversight body and the operator / specialist service provider) are clearly set out, including a clearly identified mechanism for contractual adjustments. Guidance for establishing an appropriate legal foundation is included in Module 3.2: contract key provisions.

As it is not possible to prepare a module that covers all types of contracts that could be established, the focus of this module is on contracting a local private operator to assume responsibility for routine operations. Many of the concepts, such as defining performance objectives and providing incentive payments are also applicable to other types of contracts including (i) a “performance contract” between an oversight body and a public sector manager, or (ii) between management and contractual operating staff, or (iii) for contracting specialist service providers.
3.1.1 UNDERSTAND THE LINK BETWEEN THE CONTRACT AND THE BUSINESS PLAN

Step 1 of the business planning process identified problems and possible interventions to bring about improvements. Step 2 linked the interventions to operational functions and determined which would be provided in-house and which would be outsourced. Step 3 focuses on how to design the contracts for the functions and services that will be out-sourced to an operator and other service providers. See the operational functions presented in Table 0.2.3 in Module 0.2, the detailed discussion in Module 0.3 and the list of services to be outsourced in Module 2.1.

The approach to contract design that is described in this module is based on the understanding that a contract for outsourcing services is a tool for implementing the business plan. It is tied to the business plan through the list of services to be provided by the operator and the performance standards to be achieved. Over time, the quality of information available, the skill and experience of the operator and the level of communication and trust between the contracting parties should all improve, allowing increasing levels of responsibility to be delegated to the operator. As the business plan is updated to reflect new operating conditions and better information, it may be desirable to revise the contract. For this reason, it should have a sound legal foundation and a clearly articulated mechanism for revising the operator’s responsibilities and the remuneration arrangements and incentives when conditions are appropriate. The contract legal foundation is treated in Module 3.2. Figure 3.1.1 below illustrates the links between the business plan and the contract.
Figure 3.1.1 The Link between the BP and the Contract

Step 1 Business Plan identifies actions to be taken

Step 2.1 Identifies activities and services to be provided in-house and those to be outsourced
In-house (FOR EXAMPLE):
- Ownership: decisions about investments and how to finance
- Oversight: monitoring of operator
- Responsibility for business planning
- Tariff setting

Out-source (FOR EXAMPLE):
- Capacity building for owners and oversight board
- Assistance with preparing BP
- Routine operations, including engaging staff, procuring and paying for inputs and specified replacements
- Surveys (as needed)
- Preparation and execution of investment projects (as needed)

Step 3.1 Determines Contract Profiles (Responsibilities, Outputs, Standards)
Contract 1 (FOR EXAMPLE): Owner and Oversight Board capacity building (2 year contract)
- Workshops, other training, assistance with BP

Contract 2 (FOR EXAMPLE): Routine operations (5 years)
- Core functions, including hire staff, procure/pay for inputs, routine operation and maintenance, billing and collection, customer relations, accounting, including outputs and standards to be achieved
- Procure and supervise installation of planned replacements on behalf of owner
- Cooperate and assist with BP, and investment planning
- Small investments that can be recouped within the contract term

Other contracts to be determined as needed: surveys, preparation and execution of investments, etc.

Step 3.1 Determines Contract Profiles (Bid and Remuneration Methods for Each Contract)
Contract 1 (FOR EXAMPLE):
- Lump sum for on-going advice
- Per unit fees for training as specified in fee schedule

Contract 2 (FOR EXAMPLE):
- Fixed monthly base fee to cover cost of all routine operations
- Reimbursement at cost + for pre-approved replacements
- Bonuses for achieving and maintaining targets for unaccounted for water, collections, etc.
- Penalties for serious infractions (failure to maintain minimum standards after first citation)
- Provision to move to revenue sharing arrangement over time

Step 3.2 Prepares Draft Contracts

Step 3.3 Prepares Monitoring and Evaluation Framework
Before determining the profile of the contract, it is necessary to decide how to allocate all the functions to be out-sourced among various contracted persons or entities. A number of factors need to be considered before this can be done.

**Structuring Complementary Contracts**

If a routine operator is contracted, additional support for business planning and preparation and management of expansion projects would have to be procured separately. It might occasionally be necessary to engage a separate expert to implement efficiency improvements that require special equipment or expertise, but normally the operator would be expected to incorporate routine efficiency improvements into daily operations. In addition, the operator would contribute to business planning and preparation of expansion projects by providing information and practical advice. Over time, the routine operator, or its head office, might develop the capacity to provide analytical inputs for business planning (See Figure 3.1.2).

A full service operator would provide all the skills needed for routine operations and efficiency improvements as well as analytical inputs for business planning. It might also be able to take on responsibility for planning and supervising expansion projects (as shown in Figure 3.1.2).

Separate expert services would be procured as necessary to strengthen the capacity of the oversight body and provide advice on policy decisions, such as tariffs. It would not be appropriate for the operator to provide these services, since that would create a conflict of interest. Separate contracts would also be needed for the execution of investment projects if the operator were to provide supervisory services.

**Figure 3.1.2: Structuring Complementary Contracts**

<table>
<thead>
<tr>
<th>Contract options to secure professional support</th>
<th>Routine operations</th>
<th>Business planning</th>
<th>Operational Efficiency</th>
<th>Expansion (Distribution)</th>
<th>Expansion (Production)</th>
<th>Specialist services providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Operators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Service Operators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Increasing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>delegation of functions to the operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Expansion activities awarded include planning (design), procurement and supervision of works.*
The Relationship among Responsibilities, Risks and Remuneration

The term “contract profile” is used here to refer to the way that responsibilities, risks and remuneration are balanced. Several steps are required to determine the contract profile. It may be necessary to go through several iterations before the desirable contract profile emerges. The steps include:

- Consider the range of services and responsibilities that the town has decided to outsource as part of its strategy to implement the business plan.
- Assess potential risks associated with those services and responsibilities and determine how they can be mitigated.
- Evaluate the level of risk that a contracted manager, private operator or service provider might be willing to assume, given the mitigation methods that can be applied.
- Select the services to be provided, the level of responsibility and risks that the contracted party will be expected to assume.
- On that basis, determine the appropriate bid (or negotiating) basis, the remuneration method/s and the duration of the contract.

Grouping Functions into Contracts

The first step is to decide which functions and services will be included in each contract. This will depend on the list of services to be outsourced and the types and capacities of the companies that can be expected to bid for the contracts. It is generally less costly to engage local companies and individuals and they often understand the context better than outsiders, so grouping services and functions to maximize the participation of local service providers makes sense. The following example (Box 3.1.1) shows how functions to be outsourced may be grouped.

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2 Rather than refer to specific contract types such as management contracts, lease contracts and concessions, the approach adopted here is to conceptualise a range of contract profiles initially with limited risks and responsibilities (for example, managing routine operations with responsibility to pay for most day-to-day inputs but not for replacements, expansions and new investments) but with mechanisms for gradually transferring more risk and responsibility to the operators.
Box 3.1.1: Example: Grouping functions into contracts

Let us assume that during Step 2.1, the town authorities identified the activities and services to be provided in-house and those to be outsourced as follows:

**Functions to be performed in house:**
- Ownership of assets, including decisions about investment projects
- Oversight of the operator
- Responsibility for business planning (including approving and procuring finance for investment projects)
- Tariff setting

**Functions to be outsourced:**
- Capacity building for town leaders and oversight board
- Assistance to prepare the business plan
- Routine operations, including engaging staff, procuring and paying for inputs and specified replacements
- Surveys (as needed)
- Preparation, supervision and execution of investment projects (as needed)

Let us assume that the information about local capacities that was collected in Step 2 reveals that the capacity building and business planning activities could be provided by two or three consulting companies that have offices in the capital of the country or by the national utility that operates in the capital; that routine operations could be performed by small local operators that have been created by local construction companies or by former employees of the national utility; and that surveys and the preparation of investment projects to be financed by international lending/aid agencies may require the participation of international companies with local partners but these activities are not needed immediately. Based on this information, the town decides to group functions to be outsourced into contracts as follows:

- **Contract 1:** A two-year Capacity Building Contract for the town leaders and oversight board that includes:
  - Workshops/training in financial management, tariff setting, project identification and preparation, demand management, etc.
  - Assistance with business planning

- **Contract 2:** A five-year Contract for Routine Operations that includes:
  - Core functions, including hiring staff, procuring/paying for inputs, routine operation and maintenance, billing and collection, customer relations, accounting, achieving contractually specified outputs and standards
  - Procurement and supervision of installation of planned replacements on behalf of owner
  - Cooperating and assisting with BP and investment planning

- Other contracts for user surveys and preparation, supervision and execution of investments, etc. — to be prepared and awarded as needed.

The remainder of this Module deals with routine operational contracts such as that described as Contract 2 above. An example of a detailed list of services that would be provided under Contract 2 is presented in the List of Services (Example) attached to this Module.
As a general strategy is best to start by considering a simple contract based on a fixed monthly fee plus bonuses for good performance. This implies a need to set targets and performance indicators. Over time, once the information base improves, and the level of trust between the contracting parties builds up, it may be possible to move to a revenue sharing arrangement. The advantage of revenue sharing is that it internalizes the incentives for the operator to perform.

Different contractual obligations, bidding procedures and remuneration methods imply different risks for the contracting parties. For example, if bidders for a contract to manage routine operations are asked to bid a fixed monthly management fee, there is a risk that even the lowest bid may exceed the funds available to pay the operator. A fixed fee thus implies a high risk for the contracting party.

There are a number of ways to mitigate this risk:

- Determine in advance how much users are willing to pay for better services and how much demand might increase in response to better services and expansion of access.
- Estimate the operator’s costs and a reasonable level of profit to determine whether bids are likely to exceed the available revenues.
- Establish a ceiling on bids and/or the right to reject all bids.
- Seek a temporary subsidy/grant to cover the operator’s fee until demand reaches a sustainable level.

Over time, some of the risk could be transferred to the operator by changing the bid basis (and remuneration method). For example, ask bidders to specify a fixed percentage of revenues instead of a fixed fee. This method also creates an incentive for the operator to maximize revenues so as to maximize its remuneration.

That would be the case once certain conditions exist:

- Water tariffs and users' willingness-to-pay are adequate.
- The supply of water is secure.
- The operator has sufficient control over factors that affect revenues, in particular, billing and collection functions and the disconnection of users who do not pay for service.
- The availability of resources to reduce unaccountable water and the opportunity to expand connections would add to the attractiveness of the approach.

Table 3.1.1 presents a list of risks that typically arise in operational contracts and examples of potential mitigation methods.
Table 3.1.1  Typical Risks Associated with Contracts for Operating Water Services

<table>
<thead>
<tr>
<th>Risk</th>
<th>Explanation</th>
<th>Mitigation Methods</th>
</tr>
</thead>
</table>
| Demand lower than projected           | Revenues would fall short of expectations and the operator’s and/or oversight Board’s incomes could be lower than projected. Users might have to pay higher tariffs. | 1. Avoid risk by planning carefully and conducting demand studies prior to construction.  
2. Phase construction to match demand.  
3. Appropriate connection policy, including up front connection agreements with agreed minimum consumption.  
4. Allow the affected party to initiate tariff revision process to restore equilibrium (“financial equilibrium clause”).  
5. Tariff rules that favor financial viability and encourage efficiency. |
| Inappropriate system design (other than oversizing) | Operating costs may be higher than justified and the operator’s and/or oversight board’s income could be lower than projected. Users might have to pay high tariffs. | 1. Avoid risk by engaging reputable engineers who understand the context to prepare design.  
2. Financial equilibrium clause and reasonable tariff rules ensure that costs are shared fairly. |
| Bid price higher than expected        | Even the lowest bid may exceed estimates and would require excessive or unpopular increase in tariffs. | 1. A ceiling can be set for bids.  
2. Town may retain right to reject all bids. |
| Tariff and other regulatory risks     | Authorities may fail to establish tariffs that allow financial viability. New laws (such as environmental standards) may impose additional costs on operator or oversight board. | 1. Establish reasonable tariff rules and procedures.  
2. Financial equilibrium clause. |
| Commercial risk                       | Users may fail to pay for services.                                         | 1. Operator has the right to disconnect users who do not pay and rules governing disconnection are clear and fair.  
2. Reliable subsidies are available for the poorest households.  
3. A community fund provides short-term loans to households experiencing temporary difficulties. |
| Unreliable base data                  | Information about the system’s performance prior to engaging the operator may not be correct. | 1. Allow for a start-up period during which base-year performance data are verified.  
2. Performance targets may be set as percent increases or marginal improvements that will be applied to the verified base-year data. |
| Disputes                              | The operator, oversight board and/or users may not be able to resolve disputes by mutual agreement. | 3. Arrangements for independent third-party arbitration or mediation of disputes. |
The decision about how to structure the operator's remuneration depends on several factors, including the duration of the contract, which outcomes the oversight body wishes to encourage, the capacity of the oversight body to verify outcomes and administer payments, how much control the operator has over outcomes, and how much risk the operator is willing to assume.

If the town wishes to encourage the operator to make small investments, the contract must create conditions under which a satisfactory rate of return is likely to be achieved. The most common remuneration methods and some of the conditions under which they would be appropriate are described here. Two or more of these methods can be combined to create the most appropriate arrangement.

- **A fixed or minimum fee** for service is paid regardless of performance. This method ensures that the operator receives minimum compensation and may be related to the provision of specified staff. It is most appropriate when the parties to the contract lack experience in such arrangements and want to use the contract to gain experience and build confidence.

- **A fee per unit** can be established for services the operator is to provide, particularly when the volume may vary from month to month or when the oversight body wants to encourage the operator to maximize volume. Such units may include: the number of bills issued, the volume of water for which payment was collected, the length of the network that was maintained, the number of new connections installed, etc.

- **A list of reimbursable expenses** allows the operator the freedom to respond to emergencies and some discretion in undertaking routine repairs or maintenance work, without delays in authorizing the release of funds. There is often a ceiling on such reimbursables, above which prior authorization must be obtained. This approach does not create an incentive for improving efficiency but it may be appropriate when the need for repairs is unpredictable.

- **Bonuses** are used to reward good performance when such rewards are not already built into the remuneration method. They are based on actual performance or outcomes compared to a list of performance targets and standards. The amount of bonus payments associated with achieving specified levels of performance may be specified in a performance compensation table that is annexed to the contract. An example of such a table is included at the end of this module. Bonuses linked to specific levels of performance are most appropriate to very simple short-term contracts when the key objective is to improve and expand service quickly.

- **A percentage of revenues or profits (or of improvements in these)** motivates good overall performance in longer term contracts where the operator is expected to take more initiative and assume more risks. The basis should be easily and unambiguously measurable. This means that cash measures, such as revenues and increased cash flow, are to be preferred to accruals measures such as profit. If the method creates any perverse incentives that undermine service quality or sustainability, these must be

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3 It is unlikely that very small towns will be trying to attract substantial private investment. However, operators in small towns are often willing to make small investments in expansion if the conditions are attractive.

4 Sometimes the standard cannot be achieved immediately for technical or economic reasons. In such cases, targets may be established as interim steps leading to the eventual achievement of the standard.
counteracted by strict enforcement of performance standards. For example, if the operator gets a percentage of profits, it may reduce operating expenses to the point that service quality or maintenance practices are compromised. Another point to consider is that, if contractual arrangements do not place a limit on the operator’s return, it will escalate and may become excessive as the system expands.

- **Penalties** are negative payments the operator must make to a public authority or to users as a result of failing to meet essential standards or requirements. Penalties should be limited to serious incidents, because they are not a good way to motivate operators and, in practice, the corporate oversight body may be loath to enforce them.

- **An attractive Internal Rate of Return (IRR) on investments** is necessary to encourage a private operator to invest in services. In general, decisions to invest (whether by the public or the private sector) should be driven by an evaluation that shows that resulting revenues (or other benefits) will generate an attractive IRR. If that is the case and if the duration of the contract is long enough and the private operator’s remuneration (e.g., a percentage of profits) captures enough of the benefits, it should not be necessary to guarantee a specific IRR. However, if the operator is not confident that a reasonable IRR can be earned through the remuneration method for operating services, or if the operator does not control enough of the factors that would generate an acceptable IRR, then a fixed IRR may have to be guaranteed. See Module 1.6 for the NPV method for appraising small investment projects.

The method for remunerating the operator must take into account the need to allocate some of the revenues to establishing a fund for replacements and expansions and for the cost of oversight (see the example for Nzega town in Tanzania).

Example of Remuneration as a Percentage of Profits: In the small town of Nzega in Tanzania, the Water Board has contracted a private operator (WEDECO), who is supervised by the Manager (representing the Water Board). 11% of revenues are set aside in a capital fund. Operating costs including staff salaries are then paid. The Water Board and the Operator then share the profit 70:30. The operator's share is about $1,000 / month. Improvements that are noticeable in Nzega relate to metering, number of connections, leakage control, management of illegal connections, number of hours of service, quantity and quality of water, and coverage. The operator has begun to make limited investments, e.g. in a backup generator set.

Table 3.1.2 presents a range of illustrative contract profiles along with the typical risks such profiles imply and the bid bases and remuneration methods that might be appropriate.
<table>
<thead>
<tr>
<th>Type of Services</th>
<th>Risks that are Relevant to Bid Basis and Remuneration Methods</th>
<th>Bid Basis and Remuneration Methods</th>
</tr>
</thead>
</table>
| Specialized services | - Advice may not be relevant.  
- Advice may not be implemented.  
- Managers and staff might not cooperate in implementing advice unless they share in the rewards. | - Payment per hour, day or month, only if flexibility is required and the service provider is known and has a record of providing high quality services.  
- Payment for specific outputs such as reports, designs, presentations, staffing plans, financial analysis, job descriptions, software, equipment, feasibility studies.  
- Payment based on service results is usually not practical because service provider does not control key factors that affect results. |
| - Business planning  
- Management advice and systems  
- Efficiency improvements  
- Identify/design investment projects | - Advice may not be relevant.  
- Advice may not be implemented.  
- Managers and staff might not cooperate in implementing advice unless they share in the rewards. | - Payment per hour, day or month, only if flexibility is required and the service provider is known and has a record of providing high quality services.  
- Payment for specific outputs such as reports, designs, presentations, staffing plans, financial analysis, job descriptions, software, equipment, feasibility studies.  
- Payment based on service results is usually not practical because service provider does not control key factors that affect results. |
| - Training and capacity building | - Training may not be effective.  
- Trained staff may leave the water company to work elsewhere.  
- Estimating training and resources required to train staff to a specified level of performance is difficult.  
- Candidates might not have adequate preparation and aptitude. | - Payment per unit, such as a training day, or per individual trained.  
- Payment based on objective results, such as the students’ performance on written or practical tests.  
- Payment based on on-the-job performance or service results are problematic because contractor does not have adequate control. |
| - Meter reading, billing and collection (or other core activity that can be isolated) | - Contractor may not have an incentive to bill and collect from all users, especially small volume users.  
- Users may refuse to pay if service is unsatisfactory. | - Payment per unit such as per bill issued.  
- Percentage of total amount collected.  
- A fee per account for collections in addition to a percentage of the total collected.  
- A fixed base fee. |

5 Bidding can be structured in a number of ways. For contracts in which the service provider will be paid a fixed monthly fee as well as several unit fees, bidders may be given an estimate of the number of units per month in each category, and be asked to multiply their bid fee for each category by the estimated number of units and sum the totals for all categories to obtain a single value. This value may be added to the operator’s bid for a basic fixed monthly fee to obtain a single monthly bid rate which will be compared to other bidders’ bid rates. Once the contract is awarded, the variable part of the operator’s remuneration will be based on the actual number of units of services provided each month. This will be added to the fixed basic monthly fee that the operator bid.

6 Outsourcing core activities is not likely to be cost effective in very small towns. However, individual staff can be engaged on a contract basis by the operator.
<table>
<thead>
<tr>
<th>Type of Services</th>
<th>Risks that are Relevant to Bid Basis and Remuneration Methods</th>
<th>Bid Basis and Remuneration Methods</th>
</tr>
</thead>
</table>
| Routine operations/service provision | - Operate and maintain production plant and distribution network  
- Maintain buildings, appurtenances and associated land  
- Engage, train and supervise staff required for providing services  
- Procure and manage all parts and materials required for routine operations  
- Install and maintain user connections and meters  
- Meter reading, billing and collection  
- Respond to customer inquiries and complaints  
- Maintain accurate financial accounts  
- Monitor and report performance indicators  
- Contribute to business planning and identification of expansion and improvement projects  
- Advise the oversight board regarding rehabilitation, major repairs, environmental abatement or protection actions that are needed to ensure the sustainability, safety and effectiveness of services | - If the operator receives a fixed fee from which it must pay all costs, it might try to maximize its own profits by reducing operating costs in a way that compromises the quality and sustainability of services.  
- If the operator is reimbursed for actual costs, it has no incentive to improve efficiency.  
- Revenues might not be adequate to cover the operator’s fees as well as oversight costs and contributions to a replacement fund.  
- Initial market or operating conditions that are outside the operator’s control may constrain revenues. | - Linking the operator’s remuneration to achieving specified service quality and efficiency standards creates incentives to maintain quality.  
- Establishing fees as a percentage of revenues or profits creates an incentive to increase revenues and reduce costs, and ensures that part of the revenues will be available for oversight costs and replacements.  
- For reimbursables, the operator may be required to demonstrate that its procurement methods minimize costs or that its costs are comparable to those of competitive enterprises.  
- If conditions outside the operator’s control limit revenues, a temporary minimum base fee (paid from another revenue source) enables the operator to cover basic costs until market and operating conditions improve. |
**3.1.5 SUMMARY OF THE CONTRACT PROCESS**

*The process of deciding how to structure a contract to outsource service delivery can be summarized as follows:*

- The business planning process identifies problems and solutions and prioritizes interventions. This is the basis for making decisions about whether service delivery functions will be delegated and, if so, what results are expected.
- Other important contract objectives to consider include access to management expertise, tariff discipline and access to private capital.
- Decisions about how many contracts are needed and which services and functions to include in each contract should be based on practical considerations such as when the services are needed, as well as an assessment of the required skills and the existence of private firms that could perform the services.
- A contract should clearly specify the services to be provided by the operator, the expected outcomes and how remuneration will be determined.
- An appropriate "contract profile" is one that balances responsibilities, risks and remuneration. Decisions about the contract profile, including the allocation of contractual responsibilities, the bidding procedure and the remuneration method, depend, among other things, on what the risks are, whether they can be mitigated and who can best control them.
- Remuneration may be fixed or may vary depending on the operator’s performance. The decision about how to structure the operator’s remuneration depends on several factors, including the duration of the contract, which outcomes the oversight body wishes to encourage, the capacity of the oversight body to verify outcomes and administer payments, how much control the operator has over outcomes, and how much risk the operator is willing to assume.
- The simplest methods of payment are: a fixed fee for service, a fee per unit of service provided and reimbursables up to a fixed ceiling. These are most appropriate for very short contracts and when the operator does not control the key factors that affect success.
- Bonuses, remuneration as a percentage of revenues or profits, and penalties create more incentives for achieving specified performance standards. They are appropriate for longer term contracts and those in which the operator controls the key factors that affect success.
- Performance based contracts require a table of performance standards and targets to be achieved over time. When it is unrealistic to expect the desired performance standards to be achieved immediately, it is important to specify realistic annual targets until the standards are achieved. If remuneration is linked to the achievement of specific targets, an incentive compensation table specifies the bonuses that are applicable to various levels of performance.

Figure 3.1.4 below presents a simple decision tree to help guide the preparation of contracts.
Figure 3.1.4 Contract option decision tree

Identify problems and solutions (Modules 1.2 to 1.5)

Prioritize interventions (Module 1.6)

Identify functions that can be outsourced (Module 2.1)

Decide whether to provide in-house or outsource (Module 2.1)

In-house

Consider options to build capacity (Module 2.1)

Outsource

• Help desk and outreach training
• NGO technical assistance
• Aggregation

• Routine Operations
• Operational Efficiency
• Business Planning Advice
• Identification/Preparation of Expansion Projects

• Management expertise
• Tariff discipline
• Access to private capital

Specify and group functions to be delegated (Module 3.1)

Review other key objectives (Module?)

Evaluate risks, how to mitigate and allocate (Module 3.1)

Determine remuneration method (Module 3.1)

Prepare performance standards and compensation tables (Module 3.1)

Draft contract (legal clauses, mechanism for contractual adjustment specification of services, performance standards and method of payment) (Module 3.2)
The last step in the contract preparation process is to prepare a table of performance standards and targets which specifies the expected levels of performance overtime. The incentive compensation table specifies the bonuses that are applicable to various levels of performance. The following points should be noted when preparing these tables:

- The indicators on which performance bonuses and penalties are based should reflect the goals set out in the business plan. They should be as few in number as possible. They may include both service quality objectives such as an increase in numbers of connections and operational performance ratios such as unit energy use = (energy expenses / m3 into supply). Module 3.3 sets out a comprehensive list of potential indicators in detail. It is not recommended that all these be included in contracts.
- Careful attention must be paid to establishing the base year indicator values. If they cannot be confirmed, an interim period (e.g., the first year of the contract) should be allowed for collecting the required information and confirming the starting values. During that period, the operator’s remuneration would either not be linked to the performance indicators for which base year values are unconfirmed or its performance would be assumed to be satisfactory or better.
- The methods and interventions by which improved performance will be achieved may be identified in the Business Plan if the method is itself an important objective. However, it is generally preferable to give operators as much control over technical operational decisions as possible so, if the oversight board is concerned only about results and is indifferent to the methods used, bidders could be asked to present strategies and methods in their proposals.
- Adequate funds should be available to achieve the specified performance standards; and the sources of the required funds (operations and maintenance budget and any rehabilitation and repair funds) should be identified prior to bidding for the contract.
- Performance standards should be revised infrequently, no more than every three to five years, and then only if pre-specified changes in the operating conditions warrant the change.
- Penalties should be applied only to serious failures that threaten lives or damage the environment or infrastructure.

In the attached annexes, a number of “pro-forma” charts are provided (these would be attached to the contract document as a list of schedules):

- The Detailed List of Services (Example) lists the services the operator would be expected to provide under a contract for routine operations, such as that described as Contract 2 in Section 3.1.2 above.
- The Monitoring and Reporting Schedule lists the information the operator is required to maintain and the schedule for reporting.
- The Performance Standards Table (Example) presents a limited number of basic indicators for which standards and targets have been established.
- The Incentive Compensation Table (Example) demonstrates how to determine the operator’s compensation for achieving a specified performance level.
Annex 1: Schedule A. Detailed List of Services to be Provided under a Routine Operations Contract (Example)\(^7\)

Each of the operational functions delegated to the operator will require a provision. Some samples are shown below. Further details on structuring the contract key provisions are provided in Module 3.2.

New customer connections:

The Operator shall supply water to any Customer who applies for a service connection and who is located in the Service Area. The Operator shall ensure that water is supplied to a Customer:
(a) no later than [specify number of days, e.g. eight] days after the date of receipt of the signed Standard Application Form for existing connections;
(b) no later than [specify number of days, e.g. thirty (30)] days after the date of receipt of the signed Standard Application Form for new connections not requiring extensions or reinforcements; or
(c) no later than [specify number of days, e.g. ninety (90)] days after the date of receipt of the signed Standard Application Form for connections requiring extensions and reinforcements for distance between [specify distances, e.g. fifty (50) and two hundred (200)] meters of the Initial Supply Network.

Mechanical and electrical equipment routine maintenance:

All mechanical and Electrical Equipment used in the provision of the Services shall be kept in good working order, in accordance with generally accepted technical standards and sound engineering water practices.

For Commercial Services, e.g. meter reading, billing and collections:

The Operator shall, in respect of each calendar month [or another period as may be specified], and no later than [specify number of days, e.g. five (5)] days after the end of such month, prepare a report to the Authority containing:
(a) the billings for the month showing distinctly the net billings, Value Added Tax, and gross billings;
(b) collections for the month showing distinctly the net billings, Value Added Tax and gross billings collected;
(c) the Value Added Tax due from and payable by the Authority on account of the billings and collections for the month.

The Authority may require and the Operator, when notified, is obliged to appear in meetings of the Authority convened to discuss the affairs of the Authority. The Authority may request the Operator to make such presentations, reports, demonstrations or take such actions as the Authority may deem necessary with reasonable prior notice.

Complaints handing:

At all times, the Operator shall provide the highest quality services to its Customers that are practically achievable and shall be responsible to give prompt responses to Customer inquiries and complaints. In so doing the Operator should give adequate and timely notices to Customers at least [specify number of days, e.g. forty eight (48)] hours in advance of any planned interruptions in water supply.

Minor works:

The Operator shall undertake the specified minor works identified in the Schedules, for which it shall be entitled to receive a fee as provided for in the remuneration formula in the Schedules of the Contract.

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\(^7\) “routine operations” can include: valve inspection and exercising, water main cleaning and flushing, pipe location and leak detection, emergency repairs and other minor works, meter maintenance, O & M of storage facilities, O & M of pumps, record keeping for pipe network maintenance.
Annex 2: Schedule B. Reporting and Monitoring Requirements (Example)

The Operator shall, on a quarterly basis, submit a report with the following information (these items may be revised according to the business plan objectives and performance indicators):

<table>
<thead>
<tr>
<th>Data Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Number of residential (house and yard tap) connections</td>
</tr>
<tr>
<td>- Number of public standpipe connections</td>
</tr>
<tr>
<td>- Number of institutional connections</td>
</tr>
<tr>
<td>- Number of industrial and commercial connections</td>
</tr>
<tr>
<td>- Number of connections with operating meters</td>
</tr>
<tr>
<td>- Average number of households sharing each residential connection</td>
</tr>
<tr>
<td>- Average number of persons per household</td>
</tr>
<tr>
<td>- Production capacity (m3/day)</td>
</tr>
<tr>
<td>- Transmission capacity (m3/hour)</td>
</tr>
<tr>
<td>- Water storage volume (m3)</td>
</tr>
<tr>
<td>- Length of water distribution network (m)</td>
</tr>
<tr>
<td>- Tariff structure (LC/m3 for first 6 m3/month, 6-15 m3/month, &gt;15 m3/month)</td>
</tr>
<tr>
<td>- Connection charge (LC/connection)</td>
</tr>
<tr>
<td>- Does the utility allow customers to repay the cost of connection over time? (Y/N)</td>
</tr>
<tr>
<td>- Does utility charge a flat tariff for households with yard taps shared by neighbors? (Y/N)</td>
</tr>
<tr>
<td>- Date of complaint and date of response</td>
</tr>
<tr>
<td>- Date of request and date connection is made</td>
</tr>
<tr>
<td>- Volume of water into supply (m3)</td>
</tr>
<tr>
<td>- Billings to (income from) residential customers (LC)</td>
</tr>
<tr>
<td>- Billings to (income from) institutional, industrial and commercial customers (LC)</td>
</tr>
<tr>
<td>- Volume of water paid by institutions (m3)</td>
</tr>
<tr>
<td>- Volume of water paid by industrial/commercial customers (m3)</td>
</tr>
<tr>
<td>- Cash collected (revenue) from residential customers, excluding connection charges (LC)</td>
</tr>
<tr>
<td>- Cash collected (revenue) from institutional, industrial and commercial customers, excluding connection charges (LC)</td>
</tr>
<tr>
<td>- Cash collected (revenue) for new connections</td>
</tr>
<tr>
<td>- Hours/day that borehole and intake pumps operate</td>
</tr>
<tr>
<td>- Number of unscheduled interruptions lasting more than one hour</td>
</tr>
<tr>
<td>- Duration of supply (hours/day)</td>
</tr>
<tr>
<td>- Number of connections with discontinuous service each day</td>
</tr>
<tr>
<td>- Number of pipe breaks in distribution system</td>
</tr>
<tr>
<td>- Operating expenses (excluding depreciation charges)</td>
</tr>
<tr>
<td>- Salaries and wages (LC)</td>
</tr>
<tr>
<td>- Energy expenses (LC) + KWH and liters of fuel</td>
</tr>
<tr>
<td>- Total debt service (LC/year)</td>
</tr>
<tr>
<td>- End of year accounts receivable (LC)</td>
</tr>
</tbody>
</table>
## Indicators

### Impact on consumers
- Water production (liters/capita/day)
- Number of households with access to connections
- Number of people served
- Number of households with access to connections / total number of households in the service area as percent
- Average time between complaint and response (days)
- Average time between request for and installation of connection (days)
- Duration of supply (average hours/day)
- Number of unscheduled interruptions per month lasting more than one hour.
- Revenue per person served (LC/person/year)
- Annual cost of water for a household consuming 3m3 of water per month from a yard tap.
- Annual cost of water for a household consuming 3m3 of water per month from a standpipe.
- Average time to collect 20 liters of water

### Financial Performance
- Amount billed per m3 into supply
- Cash collected per m3 into supply
- Amount billed (income) / operating expenses
- Cash collected / operating expenses
- UFW (volume billed as percent of volume into supply)
- Collection ratio (cash collected / amount billed)
- Collection period (days)
- Debt service ratio (debt service / revenue)
- Profitability (profit before interest and tax (PBIT) / income)
- Operating cost coverage (operating cost / operating cost + debt/depreciation)

### Operational Performance
- Operating expenses per m3 into supply
- Energy expenditure per m3 into supply
- Labor costs (percent of total operating costs)
- Staffing level (number per 1000 connections)
- Number of hours/day that borehole and intake pumps operate
- Number of pipe breaks per km per year
- Metering level (% of connections with functional meter)
- Percent of connections with operating water meter
- Storage capacity (m3 of storage / m3/day into supply)
- Production capacity (volume into supply (m3/day) / production capacity (m3/day))

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> Indicates core monitoring indicator.
Annex 3: Schedule C. Table of Performance Standards and Targets (example)

(To be attached as an annex to a contract for routine operations)

Clearly define the indicator of performance and specify the desired standard against which performance will be judged and the targets to be achieved in each year of the contract. Standards and targets may be expressed as numbers, percentages, ratios, or the frequency with which the task should be carried out.

<table>
<thead>
<tr>
<th>Description of performance indicator</th>
<th>Performance standard</th>
<th>Base Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage (or number) of households with active connections within the service area</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of connections with functioning meters</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of water samples that meet WHO guidelines (or national guidelines)</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average number of hours of service per day</td>
<td>24 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collection efficiency (percentage of billed amount that is collected monthly)</td>
<td>95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of connections for which bills are issued per month</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meters of piped network cleaned and maintained per month (including valve inspection and exercising, water main cleaning and flushing, pipe location and leak detection)</td>
<td>X meters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of cleaning and maintenance of electromechanical equipment</td>
<td>X months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water losses as a percentage of total water into supply</td>
<td>15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy use in kwh (or cost) /cubic meter into supply</td>
<td>[X] kwh/m$^3$ or cost/ m$^3$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum length of interruptions in service due to routine maintenance or emergency repairs</td>
<td>3 hours in any one day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 4: Schedule D. Incentive Compensation Table (Example)

The performance levels for good, acceptable and poor performance need to be defined, as well as the size of the bonus or penalty that is applicable. Penalties are usually based on the impact on consumers indicators. Normally about five indicators are used in the incentive compensation chart.

See Module 3.3 for the long list of indicators.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Contract Year</th>
<th>Good</th>
<th>Acceptable</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Performance Level</td>
<td>Available bonus</td>
<td>Performance level</td>
</tr>
<tr>
<td>Bonuses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.g. Unit energy use = (energy expenses / m³ into supply)</td>
<td>Year 1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penalties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to notify users of a contamination</td>
<td>Year 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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| Year 2 |                   |               |                   |         |
| Year 3 |                   |               |                   |         |
| Year 4 |                   |               |                   |         |
| Year 5 |                   |               |                   |         |
This module sets out the key provisions (content) to include in a contract for routine operations, discusses why each provision is important and specifies what to consider in drafting it. The contract content described here would be appropriate for a simple operations and maintenance contract for an existing system, with provision for investment in improvements and expansion. Such a contract would normally have a term of about five years. In drafting the contract, the obligations and risks faced by each party should be carefully considered and established in light of the actual conditions that prevail in each case. The outline provided here may need to be revised to reflect such conditions.

The underlying principle is that a robust legal foundation with a suitable mechanism for contractual adjustments, will allow some flexibility (adjustment) in the specific obligations of each party and remuneration of the operator. For example, as the information base improves and levels of trust build up between the contracting parties, the operator may be willing to take on more responsibilities and return move from a fixed monthly fee to a share in operating cash flows.

Module content
- Basic legal clauses: the legal foundation of the contract.
- Specific obligations of each party: for example, the services to be provided by the operator and the obligation of the contracting party with regard to the operator’s remuneration.
- The Schedules: detailed information that would be cumbersome to include in the main clauses of the contract but which are legally an integral part of the contract.

Note that the schedules are based on the results of Module 3.1 and form the basis of the monitoring and evaluation framework that is discussed in Module 3.3.

The contract described here has three main sections.

Basic legal clauses that establish the legal framework and govern relations between the two parties include the following:

1. Contract objectives and definitions
2. Representations and warranties
3. Commencement and duration
4. Revision of the contract
5. Business Plan and obligation to act in good faith
6. Auditing of performance and mediation of disputes
7. Suspension and Termination
8. Force Majeure
9. Performance guarantees
10. Arbitration
11. Miscellaneous
Clauses that describe the more specific obligations of the parties include the following:

12. Services to be provided by the contractor
13. Right of access to facilities
14. Contractor’s obligation to report and right of access of the contracting party
15. Obligations of the contracting party
16. Remuneration of the contractor
17. Adjustment of the contractor’s remuneration
18. Variations to operational functions

Schedules that provide detailed specification regarding:

A. Services to be Provided
B. Performance Standards and Targets
C. Operator’s Reporting Obligations
D. Remuneration Method
E. Facilities to be operated by the Contractor

3.2.1 **PART I: LEGAL BASIS**

This section describes the clauses that form the general legal framework under which the parties to the contract will operate. According to the World Bank’s “Guide to Using Private Firms to Improve Water Services” (World Bank 2004), regardless of the legal traditions of any given country there are certain basic recommendations in preparing a contract:

- It is always necessary to check the laws of the country in question in detail, and to ensure that the contract is consistent with these laws; and
- Whether or not certain background rules are implied, it is always a good idea to formulate the rules explicitly in the contract. This will provide greater certainty for the parties.

1. **Contract Objectives and Definitions**

*Why is this provision important?*

This provision specifies the parties to the contract, the broad objectives and definitions of terms. It may be preceded by a Preamble that refers to relevant laws, decisions or policies that provide a context for the contract.
Content of this provision

• Names and contact details of the contracting parties.
• Objectives of the contract, providing details as to the public sector contracting party delegating certain service provision responsibilities to the operator, and the operator accepting responsibility to provide specified operational functions to an agreed level of performance and to be paid according to an agreed formula.
• Definitions of terms used in the contract.

2. Representations and Warranties

Why is this provision important?
The parties entering into the contract must be in a legal position to do so.

Content of this provision

• Statement of each party's legitimacy and authority and the absence of legal barriers.

3. Commencement and Duration

Why is this provision important?
The contract must have a precise period of effectiveness, i.e., a date of commencement and a date of termination

Content of this provision

• Statement of the conditions that must be met before the contract becomes effective (for example, signature of the contract by the legal representatives of each of the parties).
• Precise definition of the commencement and termination dates.

4. Revision of the Contract

Why is this provision important?
This provision is linked to clauses 17 and 18 and the schedules, which are concerned with remuneration of the operator and the operational functions to be provided. Since business plans are adjusted from time to time to meet changing conditions and growth in demand, it may be desirable to revise the contract in light of conditions and circumstances that cannot be predicted with precision in advance. This provision allows the parties to anticipate likely revisions of the contract, and to establish procedures to revise the contract in a spirit of cooperation. The emphasis is on positive changes, such as improvements in the information base and growth of demand, which allow the operator to take on increasing responsibilities.
Where possible the revisions of the contract should be limited to remuneration and operational functions.

**Content of this provision**
- Conditions that may lead to a revision.
- Procedures for revising the contract by mutual agreement.

5. **Business Plan and obligation to act in good faith**

*Why is this provision important?*

The contract is a tool for implementing the business plan. Since future revisions to the business plan may make it desirable to revise the contract, it is important that the operator and the public sector contracting party work jointly to develop future business plans.

The “principle of good faith” aims to promote cooperation between the parties with regard to the business plan. A constructive and collaborative relationship results from identifying and recognizing common interests, a fair allocation of risks, and creating incentives to collaborate and share information. If that is the case, the operator and the public sector contracting party will be focused on achieving the best performance for their mutual benefit.

**Content of this provision**
- Statement that the operator will be consulted and is expected to contribute to the development of business plans that cover a defined period of time (typically 3 to 5 years);
- An obligation for the two parties to share information and collaborate in resolving problems.
- Specification of mechanisms for approval and amendments to the business plan.

6. **Auditing of Performance and Mediation of Disputes**

*Why is this provision important?*

An independent auditor will provide an objective assessment of the operator’s performance and reports, and will verify whether contract provisions are being complied with. This provides credibility and helps to avoid unjustified interference by the contracting party or the oversight body.

**Content of this provision**
- Requirement that the contractor and/or the contracting party periodically engage an independent auditor to verify technical and financial performance reports submitted by the Operator and if applicable recommend the application of bonuses or penalties or call on performance bonds in the case of non-compliance.
- Specification of the auditor’s role in mediating disputes between the parties regarding the contractor’s performance or remuneration.
7. Suspension and Termination

Why is this provision important?

There are certain conditions under which the operator may suspend work or the contracting party may suspend the delegation of functions. For example, the operator might need to suspend work if the contracting party failed to honour its remuneration obligations. The contracting party might want to suspend the delegation of functions if the operator repeatedly failed to perform in accord with its obligations. These would normally be considered suspension for cause. However one of the parties might decide to terminate the contract at will, i.e., in the absence of conditions that justify suspension for cause under the terms of the contract. Since suspension of any kind may have negative impacts on the parties, it is important to clearly specify the events that may lead to suspension or termination for cause as well as the consequences for each type of termination. The objective is to protect each of the parties from unjustified negative impacts.

Suspension and termination provisions establish the circumstances under which the contract may be suspended or terminated, and whether and how much the parties to the contract are to be compensated.

Content of this provision

- Conditions under which suspension may occur.
- Condition under which termination for cause (because of a particular event) may occur.
- The right of each party to terminate the contract at will (at the discretion of the party).
- Suspension or termination for Force Majeure events.
- Methods of determining compensation in the event of suspension or termination.

8. ‘Force Majeure’

Why is this provision important?

A ‘Force Majeure’ (FM) is typically an event which is beyond the reasonable control of a party, and which makes that party’s performance of its obligations impossible or impractical. The FM clause is important because it specifies what constitutes FM and provides for termination of the contract when neither party is at fault.

FM should be limited to events that render the provision of service impossible, such as an earthquake or war. Events which increase the cost of providing the service such as a currency depreciation, or events which are foreseeable but uncontrollable such as irregular electricity supplies, should NOT be included in the definition.
Content of this provision

- Obligation of the contracting party and the operator to work to overcome the event and restore service as quickly and fully as is reasonably possible;
- Obligation of the Operator to submit to the Authority a plan for how it will overcome the event and of the contracting party to cooperate in the restoration of service and to grant an extension of time to complete or fulfil certain obligations that have been affected by the event of FM;
- Right of the Operator to be paid for a limited period (for example, three months) during the suspension or reduction of services. If the event, or its effects, last more than a defined period either party has the option to terminate the contract.

9. Performance Guarantees

Why is this provision important?

A performance bond or guarantee creates a strong incentive for the Operator to carry out its operational obligations, and provides a mechanism for imposing a sanction in the event the Operator fails to do so. Without a performance bond, the Authority might need to sue the operator for non-performance, which would be costly and time-consuming, and even if the court found in the Authority’s favour, it might be difficult to actually make the Operator pay. In the small town context, the benefit of a performance bond needs to be carefully weighed against the financial limitations of small service providers and its impact on competition for the contract. If the bond is onerous, very few potential bidders may be able to participate.

Content of this provision

- The amount of the bond or guarantee and how it is to be posted.
- The conditions under which a performance bond or guarantee may be “called”, i.e., forfeited by the Operator.
- Specification of procedures that should be exhausted before non-compliance with obligations can be deemed as a breach of contract.

10. Dispute Resolution and Arbitration

Why is this provision important?

The contract should balance risks and rewards and establish win-win objectives, i.e., conditions under which both parties are likely to benefit. However, disputes may nevertheless arise. It is therefore important that the contract has provisions to effectively address and resolve disagreements. Dispute resolution procedures need to be clear, cost effective and time-efficient.

Content of this provision

- Procedure for initial negotiation between the parties. If the two parties cannot reach an agreement between themselves, then the dispute can be taken to the auditor who would
either make a non-binding recommendation or would be empowered to investigate, hold discussions with the two parties, and make a recommendation.

- Procedures to follow if the parties still cannot reach an agreement on the basis of the auditor’s recommendation. For example, the dispute could go to an arbitrator, who would make a final and binding decision.
- Identification of the arbitrator or the process for choosing an arbitrator.

11. Miscellaneous

*Why is this provision important?*

This section allows for provisions that do not fit elsewhere in the contract. The content would vary from case to case. The content described below is indicative.

*Content of this provision (for example)*

- Interpretation, language and Governing Law
- List of Contract documents
- Notices
- Assignment or subcontracting
- Expenses associated with the bidding and contract process
- Severability
- Joint Venture Agreement

3.2.2 PART 2: SERVICES TO BE PROVIDED, REMUNERATION AND OTHER DEPENDENCIES

12. Services to be Provided by the Contractor

*Why is this provision important?*

This provision obligates the operator to provide the agreed services, achieve the specified standards or targets, submit reports and work in a spirit of partnership with the contracting party.

*Content of this provision*

- Obligation of the contractor to nominate qualified personnel.
- Commitment of the contractor to abide by the objectives of the business plan in undertaking the services of the contract.
- Obligation of the contractor to perform the services, submit reports and achieve standards or targets as specified in Schedules A, B, and C.
13. Right of Access of the Contractor

*Why is this provision important?*

The contractor must have free access to the facilities that it will operate and the surrounding land.

*Content of this provision*

- Right of access of the contractor to land and facilities specified in Schedule E.

14. Obligation of the Contractor to report and right of access of the Oversight Board

*Why are these provisions important?*

Monitoring performance requires collecting and analyzing information. The procedures for reporting and the form of reports need to be specified. The oversight board need to have adequate access to the Operator’s records and facilities to verify the information reported.

*Content of this provision*

- Obligation of the Operator to record and report performance information to the oversight board as specified in Schedule C.
- A requirement that users be consulted regarding the operator’s performance;
- The right of the oversight board to check the accuracy of the operator’s reports by means of an audit;
- Right of the oversight board to access the facilities and the operator’s records for purposes of verification of reports;
- Use of the information thus reported and verified as a basis for calculating the Operator’s bonus payments (if relevant) or penalties (if relevant);
- A requirement that the oversight board to publish the relevant standards and information on the Operator’s performance.

15. Obligations of the Contracting Party

*Why is this provision important?*

It obligates the contracting party to work in a spirit of partnership with the operator and to take specified actions on which the contractor depends.

*Content of this provision*

- Obligation of the contracting party to make payments as specified in Articles 16 and 17 (the relevant articles of the contract).
• Obligation of the contracting party to take specified actions which facilitate or enable the operator’s performance of its functions (e.g., obtaining permits and water use rights, carrying out investments that are required for the achievement of standards and targets). These may be specified in a Schedule.

• Commitment of the contracting party to consult with the operator in preparing or updating the business plan, and to abide by the objectives of the business plan in evaluating the performance of the contractor.

16. Remuneration of the Contractor

Why is this provision important?
This provision obligates the public sector contracting party to make payments to the operator as specified in a Schedule of the contract. The content of the remuneration schedule is discussed in detail in Module 3.1.

Content of this provision
• Obligation of the contracting party to remunerate the contractor in the amounts and at the times agreed.
• Reference to Schedule D which specifies the method/s and the time frame for determining the operator’s remuneration and making payments.

17. Remuneration Adjustment Procedures

Why is this provision important?
This provision allows for the adjustment of the operator’s remuneration in the event of predictable or unpredictable events that affect financial viability. The objective is to ensure that the financial position of the Operator is not affected by such events.

Content of this provision
• Periodic Adjustments which take place automatically at specified intervals during the life of the contract on the basis of an agreed method, usually on the basis of official parameters such as a price index published by the government.
• Extraordinary Adjustments in response to specific, unexpected but manageable events that affect the Operator’s costs: for example, changes in laws, new environmental standards, or changes in demand.
• Emergency Adjustments which are designed to keep the contract working in the face of unexpected changes so significant that they would otherwise bankrupt the Operator or lead to early termination or renegotiation. The objective is to ensure that the services continue and enable the Operator to return to normality after a reasonable period of time.
18. Variations to Operational Functions

Why is this provision important?
This provision is key to successful integration of the business planning process and the contract, and the transfer of increasing responsibility to the operator (see Module 3.1). The basic premise is that the legal foundations of the contract (part one) together with a robust adjustment mechanism will allow the contract to evolve in line with the changing objectives of the business plan.

Content of this provision

- Commitment of the parties to recognise the need to update the contract as appropriate.
- Identification of the Auditor as the supervisor of contract adjustments occasioned by changes in the business plan.
- Specification of provisions that may be revised, i.e., the obligations of the operator, the performance standards chart, the incentive compensation chart, and the remuneration formula.
- Statement that such revisions will occur no more than once per year unless otherwise agreed between the parties, and that changes will be made when necessary to keep the contract in line with the business plan.

3.2.3 Part 3: Schedules

Following is a list of schedules to be attached to the contract. These provide detailed specification of matters to which provisions in the main body of the contract refer. Schedules A, B, C and D are prepared according to the guidelines provided in Module 3.1. Schedule E specifies all plant, equipment, pipe systems, buildings, stores, related appurtenances and vehicles which will be operated and maintained by the contractor, including surrounding land to the extent that the land provides access to and control of facilities and/or that the operator is expected to maintain it.

Schedule A: Description of Services to be Provided

Schedule B: Performance Standards and Targets.

Schedule C: Operator’s Reporting Obligations.

Schedule D: Remuneration Method.

Schedule E: Facilities to be operated by the Contractor
The purpose of this module is to set out a framework for monitoring and evaluating town water supply and sanitation service provision. The module focuses on two aspects of monitoring and evaluation: (i) financial and technical operational performance, including impact on consumers, and (ii) project progress in terms of achieving reform “milestones” and outputs. The emphasis is on the collection and sharing of information: Who needs the information? What information do they need? Where does the information come from?

Module content
- Understand the strategic and operational context of M&E
- Identify key stakeholders and their goals
- Establish indicator sets
- Annex: Project milestones and outputs in the Stepped Approach

3.3.1. The strategic and operational context of M&E
Figure 1 below sets out the strategic and operational context of monitoring and evaluation. The town planning process is in the upper right area called “strategy”, and the “operations” run across the bottom. On the strategy side, the town decision makers establish strategic objectives in consultation with consumers and other stakeholders concerning improvements and expansions. On the operations side, interventions are identified that can help to improve operational performance. The two are linked via the business plan. The delegation of operational functions can be in-house or outsourced (see Modules 2.1 and 3.1). The M&E system is positioned to monitor and evaluate improvements in operational functions.8

Figure 3.3.1: The strategic and operational context of M&E

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3.3.2. Establish an Information System, and identify key stakeholders and their goals

Module 1.1 presented an overview of an Information System for town WSS, and the Figure is shown again below. Module 3.3 expands on the approach outlined in Module 1.1, but shifts the focus from the initial demand assessment and baseline survey, to operational performance and project progress monitoring. The module consolidates information requirements discussed in earlier modules (in particular, see Modules 1.3, 1.4 and 1.5 on understanding the utility and the market), and sets out the performance indicators needed to monitor and evaluate against business plan objectives.

Figure 3.3.2 The Town WSS Information Systems Strategy

<table>
<thead>
<tr>
<th>Consulting primary stakeholders</th>
<th>Zonal scorecards (focus groups) and limited hh surveys:</th>
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</thead>
<tbody>
<tr>
<td>• Module 1.1 (see data required in boxes 1.1.1 and 1.1.2)</td>
<td>• hh demand assessment and baseline survey – yr. 0</td>
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<td>o cross check proposed interventions</td>
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<td>• Impact assessment (progress against the baseline) – yr. 5</td>
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<th>M&amp;E for operational performance</th>
<th>Annual zonal scorecards (focus groups) and operator reporting:</th>
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<tr>
<td>• Module 3.3 (see table of performance indicators)</td>
<td>• Impact on consumers (consumer satisfaction)</td>
</tr>
<tr>
<td>• Module 3.1, annex 2, (see box on data required from the operator)</td>
<td>• Financial performance</td>
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<td>• Operational performance</td>
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<tr>
<th>Project progress monitoring</th>
<th>Milestones and triggers (may be established for purposes of reform and performance based financing)</th>
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</thead>
<tbody>
<tr>
<td>• Module 3.3 (see table of performance indicators, and the critical list in Box 3.3.1)</td>
<td>• Milestones</td>
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<td>• Outputs</td>
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The M&E framework will need to address the following questions regarding information collection and reporting:

- Who will collect information?
- How will they record the information?
- How and to whom will they report?
- How will the results be used?

**Who will collect information? How will they record the information?**

The collection of information relating to operations is primarily the responsibility of the operator (or the system manager and operating staff), together with inputs from the primary stakeholders (consumers):

- Module 3.1 annex 2 sets out the **reporting obligations of the operator**, and lists data and indicator values required.
- Module 1.1 outlines a process of consumer consultation using **zonal scorecards and limited household surveys**. This approach can be expanded for the purposes of assessing operational performance and impact on consumers (described below).
• The “Information Technology” used, e.g. computers or hand written ledgers, will depend on the complexity of operations and the available resources, including computer literacy.

In compiling data records, there will be a need to establish the following as a minimum requirement: records for customer complaints and their resolution; records of financial and technical performance (based on the information requirements of the key indicators); an audit process; records for household connections, and billing and revenue collection; a plan of the water system; a register of fixed assets; an inventory of spare parts and materials; records of bulk and connection meters; and records for pump running times.

To whom will they report? How will the results be used?
In order to keep the M&E system focused, four critical perspectives are proposed. These are the Government, the Owner (Regulatory Oversight Body), the “Utility” (Corporate Oversight Body + Operator), and the Consumers.

The Government perspective: From a National / State Government perspective the goals relate to the broader picture of town water supply nation/state-wise, ensuring sustainability of investments, and monitoring impact on consumers:

1. Basic information about towns is needed to estimate coverage and investment requirements/priorities in the country/state. This is in the form of a “pre-baseline” town inventory, and shows which towns are participating in existing or proposed investment projects and programmes. The information should be collected before any new project interventions commence, and it should be updated annually.
2. The Government can improve sustainability of investments by adopting key milestones as triggers against which to disburse financing. (See the brief “check list” of critical milestones in Box 3.3.1, and the annex for a more detailed set of milestones and outputs).
3. The Government will be interested in follow up impact assessment studies to review the baseline situation (see Module 1.1).

Box 3.3.1 Critical milestones and outputs

- Autonomous corporate oversight body (e.g. town water board)?
- Business plan and expansion proposal?
- Operator under contract?
- Tariffs cover recurrent, replacement, expansion?
- Utility with audited financial statements?
- Water supply system serving today’s population?

Regulatory Oversight perspective: Local regulatory functions revolve around monitoring operator performance (technical and financial operational performance) as well as the approval of tariffs, fees and business plans, ensuring that public health (water quality) and water resources (abstraction) standards are met, and performing any environmental (discharge) monitoring and enforcement tasks delegated to the town by the national/state government. See the guide to regulation set out in Modules 0.2 and 1.2.

The “utility” (Corporate Oversight and Operational) perspective: Depending on the type of management model that has been established, a corporate oversight body, COB, (e.g. town Water Board) may also be appointed to provide overall direction to the operator, with responsibility for preparing budgets and business plans (with help from the operator), and
monitoring operational performance. The operator will be actively involved in gathering and reporting data on operational performance, with a mutual concern that targets are being achieved. Two particular concerns in terms of day to day operations are:

1. How efficiently are resources being used, i.e. what is being done from an operational perspective to minimize the gap between system expenses and income?
2. Is system capacity sufficient to meet demand?

**The consumer perspective:** Consumers concerns fall into four categories:

1. Speed of response (to applications, complaints, service repairs etc.)
2. Accessibility.
3. Reliability
4. Cost

The methodology for consulting consumers has already been set out in Module 1.1, based on use of “zonal scorecards” and limited household surveys. This approach is developed further here as a means both to revise information on demand, and also to monitor and evaluate operational performance. To this end the scorecard should be applied periodically in each of the service zones in the town.

Typically the steps in the process should include identifying indicators, forming focus groups and assigning scores, and then meeting with service providers to explain scores, and identify priority areas and action plans for improvement.

![Diagram of the scorecard applied to M&E](http://www.roboroz.ca/scorecard/index.html)

**Figure 3.3.2. The scorecard applied to M&E**

There are four elements to a such a scorecard:

- A ‘performance scorecard’ in which the zonal focus groups assess the performance of the operator and corporate oversight body;
- An ‘input tracking scorecard’ in which selected people in the community assess the flow of resources into and through the utility;

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*Source: [http://www.roboroz.ca/scorecard/index.html](http://www.roboroz.ca/scorecard/index.html)*
• A ‘self-evaluation scorecard’ in which the operator and corporate oversight body assess themselves; and
• An ‘interface meeting’ between all stakeholders held to collate the information as a single scorecard, present findings, and seek solutions.

All of these perspectives are captured in the list of indicators set out in the table below. (As a reminder, the information for the M&E for operational performance comes from the zonal scorecards described above, and from the operator as set out in Module 3.1, annex 2).

Box 3.3.2 Other stakeholders

The list of interested stakeholders can be expanded as the business grows:

• Local banks – to finance creditworthy utilities.
• Private sector service providers – interested in business partnerships with viable utilities.
• Other utilities – as the basis for benchmarking.

In all cases an external auditor is likely to be involved, to support the Owner (Regulatory Oversight) in auditing technical and financial performance.

3.3.3. Establish indicator sets

In order to achieve coverage of strategic and operational perspectives, the following four sets of indicators are recommended:

• **Project progress indicators**: these are descriptive pass / fail type indicators that relate to reform steps and capacity building. There will be a need to periodically assess the situation in order to evaluate overall progress, which will depend on how many and which of the indicators have passed (a list of critical milestones and outputs is given in Box 3.3.1, and the table below provides a more detailed list);
• **Impact on consumers**: in terms of speed of response (to applications, complaints, etc.), accessibility, reliability and cost;
• **Financial viability**: in terms of cost recovery, liquidity and profitability; and
• **Operational performance**: in terms of how efficiently are resources being used, and whether system capacity is sufficient to meet demand.

It is important that indicators are referenced to clear strategic objectives (goals) as set out in the business plan. This gives contextual meaning to the indicator. In other words, it is the benefit that is being sought not simply achievement of an arbitrary target.

It is also important to specify the bases used to assess (benchmark) improving performance. These could include: the starting situation (a base year); or planned performance (based on forecasting); or performance of similar utilities (which need to be carefully chosen to ensure compatibility). It is recommended to use the first approach, at least initially for smaller towns, and to concentrate on the trend of the indicator value over time compared to a base year. This means that interim targets can be set in moving towards a long term standard. This is set out in the performance standards chart and incentive compensation chart for the operator (see Module 3.1).
Project progress descriptive indicators (pass / fail)

Institutional:
1. Legal status: Is the “utility” a legally recognized entity? Does it have its own staff assigned to it?
2. Financial autonomy: Are the utility’s finances ring-fenced?
3. Management autonomy: Does the utility have an autonomous corporate oversight body? Does the COB have members with professional qualifications?
4. Incentives to perform: Is there some mechanism that drives performance? e.g. identified “budget holders”, performance based contracts.
5. Accountability to users: Are customer complaints and their resolution logged?
6. Professional capability: are key technical and finance staff in place? are they trained? is there a plan to access specialist support?

Financial:
1. Financial management: Is there a mechanism to report on technical and financial operational performance? Is the information audited?
2. Billing and collection practices: Are records used for billing accurate and up to date? Is adequate financial information to hand for managerial decision making?

Operational:
1. Maintenance: Is there a regular maintenance programme?
2. Record-keeping: Is there an up to date plan of the water system? A register of fixed assets? An inventory of spare parts and materials? Records for bulk and connection meters? Records for pump running times?
3. Planning for efficiency improvements: Is there any plan to deal with efficiency improvements, e.g. unaccounted for water, pipe network performance, water pressure, metering.
4. Water quality: Is there a regular programme to monitor water quality?
5. Planning for expansion: Is there any plan for expanding the system?

Impact on consumers

Speed of response indicators:
- Average time between a complaint and response (days)
- Average time between request for and installation of connections (days)

Accessibility indicators:
- Number of households with access to a connection / total number of households in service area as a percentage
- Average time to collect 20 liters of water

Reliability indicators:
- Duration of supply (hrs/day)
- Number of unscheduled interruptions per month last one hour or more

Cost indicators:
- Annual cost of water for a hh consuming 3m3 of water per month from (i) individual connection, (ii) a yard tap, (iii) a public kiosk

Financial viability

Cost recovery:
- Cash collected / m3 into supply
- Coverage of O&M by cash collected = (cash collected / operating expenses)
- Amount billed / m3 into supply
- Coverage of O&M = (amount billed / operating expenses)

Liquidity:
- Collection ratio = (cash collected / amount billed)

Profitability:
- Net profit margin = Profit before interest and tax (PBIT) / income

Operational performance

Financial operational efficiency:
- Operating expenses / m3 into supply
- Unit energy use = (energy expenses / m3 into supply)

Technical operational efficiency:
- Production capacity: supply (m3/day) / production capacity (m3/day)
- Storage capacity: m3 of storage / supply (m3/day)
- number of hrs/day which borehole and intake pumps operate
- number of hours of storage at average daily demand
- UFW: volume billed as a percentage of water into supply
- Percent of water connections with an operating meter
- Number of pipe breaks per km per year
Annex: A note on project milestones and outputs in the Stepped Approach (EXAMPLE)
The stepped approach to the upgrade of exiting town water systems is set out below as an example. In particular, the project milestones and outputs can be used as triggers for disbursement financing under a government programme.

In the example provided below (taken from the Ethiopia small towns project), the four steps are:

Step 1: Technical Assistance to establish autonomous Town “Water Boards” and prepare application.
Step 2: Planning, capacity building and immediate service improvements.
Step 3: Rehabilitation or initial investment – for towns not previously improved with grant financing.
Step 4: Expansion (with loans).

Criteria to move from Step 1 to Step 2
- Application filed with basic information on existing water supply and sanitation, and needs.
- **Autonomous Town Water Board created and Board members appointed.**
- Stakeholder consultations held regarding program requirements, estimated costs, tariffs and contribution required.
- **Key utility staff in place for capacity building**
- Proposed immediate service improvements within per capita ceiling.

Criteria to move to Step 2, Phase 2:
- Project proposal acceptable.
- Business plan acceptable.
- Water Board meeting as scheduled and involved in planning.
- Stakeholder consultations held.
- Immediate service improvements completed.
- **Revenue covers current O&M costs and allowance for renewal and replacement of short life assets.**
- **Technical and administrative staff trained at basic level.**
- Utility operating autonomously with accountability in place.

Criteria to move to Step 3:
- Reconfirm the above based on final design.
- Local contribution deposited to bank account.

Criteria to move from Step 3 to Step 4
- Proposal for further development and expansion of the system is acceptable.
- Business plan acceptable.
- **Accounting, billing and revenue collection and M&E systems in place and efficient (as confirmed by independent audit).**
- Contracts in place to secure professional services, including mechanisms to resolve disputes
- **Full cost recovery tariffs in place for existing system.**
- Contribution deposited to account.
- **Utility operating efficiently with adequately trained technical and administrative staff, performance agreement and provision for external technical assistance.**
- Board meeting as scheduled and involved in planning.
Figure 3.3.3: Stepped approach to the upgrade of existing town water systems

Example shown applies to the Water Board management model

**STEP 1**
Technical Assistance to establish Town Water Boards and prepare application:

Technical Assistance to Towns to form Water Board, carry out initial assessment, identify immediate service improvements, consult with stakeholders and prepare application for Step 2.

**Main Criteria to Qualify for Step 2 (grant):**
- Project proposal acceptable
- Business plan acceptable
- Water Board meeting as scheduled & involved in planning
- Stakeholder consultations held
- Immediate service improvements completed
- Revenue covers current O&M costs + allowance for renewal and replacement of short life assets
- Technical and administrative staff trained at basic level
- Utility operating autonomously with accountability in place

**STEP 2**
Planning, capacity building and immediate service improvements:

Phase 1:
Technical Assistance to Water Board & utility to build capacity of board members and operator, implement financial & mgmt systems, implement immediate service improvements, prepare preliminary design for rehabilitation and expansion, feasibility studies, sanitation plan and business plan.

Phase 2:
Borehole siting, drilling
Final design & tender docs.

**Main Criteria to Qualify for Step 2, Phase 2, and Step 3 (grant):**
- Application filed with basic information on existing water supply and sanitation & needs
- Autonomous Town Water Board created and Board members appointed
- Stakeholder consultations held regarding program requirements, est. costs, tariffs & contribution required
- Key utility staff in place for capacity building
- Proposed immediate service improvements within per capita ceiling
- Board meeting as scheduled & involved in planning

**STEP 3**
Rehabilitation or initial investment – towns not previously improved with grant financing:

Investment financing & Technical Assistance to Water Boards to implement business plans, rehabilitate and expand water & sanitation facilities and carry out further capacity building of Water Board and utility during construction and for at least a year after.

**Main Criteria to Qualify for Step 3:**
- Reconfirm the above based on final design
- Local contribution deposited to bank account
- Utility operating efficiently with adequately trained technical and administrative staff, performance agreement and provision for external technical assistance

**STEP 4**
Expansion:
Investment financing & Technical Assistance to financially viable utilities for longer term expansion, including construction supervision – financed through internally generated cash and lending on commercial terms.

**Main Criteria to Qualify for Step 4 (loan):**
- Proposal for further development & expansion of the system is acceptable
- Business plan acceptable
- Accounting, billing and revenue collection & M&E systems in place and efficient (as confirmed by independent audit)
- Contracts in place to secure professional services, including mechanisms to resolve disputes
- Full cost recovery tariffs in place for existing system
- Contribution deposited to account
- Utility operating efficiently with adequately trained technical and administrative staff, performance agreement and provision for external technical assistance
- Board meeting as scheduled & involved in planning