**Development of a Comprehensive**

**National Rural Water Supply & Sanitation Programme**

# PHASE 2 REPORT (FINAL)

## VOLUME 1: MAIN REPORT

**Submitted to:**
**National Directorate of Water Supply and Sanitation**
**Government of Angola**

**Submitted by:**
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**FEBRUARY 2015**

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACA | Water Consumer Associations |
| AfDB | African Development Bank |
| AWF | African Water Facility |
| BMEA | Municipal Energy and Water Brigade |
| CACS | Social Dialogue and Consultation Councils |
| CAPEX | Capital Expenditures |
| CBO | Community-Based Organization |
| CCCA | Community Councils of Water Consumers |
| CEDAW | Convention on the Elimination of All Forms of Discrimination Against Women |
| DNA | National Directorate for Water |
| DNEP | National Directorate of Private Education |
| DPE | Provincial Directorate of Education |
| DPEA | Provincial Department of Energy and Water |
| DRA | Demand-Responsive Approach |
| DW | Development Workshop |
| EMEA | Municipal Energy and Water Utility |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| FAS | Social Support Fund |
| GAS | Water and Sanitation Groups |
| GoA | Government of Angola |
| GPS | Global Positioning System |
| GTI | Intersectorial Technical Group *(Grupo Técnico Intersectorial)* |
| HIV / AIDS | Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome |
| HR | Human Resources |
| HRD | Human Resource Development |
| IBEP | Integrated Survey on Household Well-Being |
| IBNET | International Benchmarking Network for Water and Sanitation Utilities |
| IFAD | International Fund for Agricultural Development |
| IFAL | Local Administration Training Institute |
| ILO | International Labour Organization |
| INAS | Water and Sanitation Institute |
| INE | National Statistical Institute |
| IT | Information Technology |
| JMP | Joint Monitoring Programme |
| JSR | Joint Sector Review |
| LPCD | Litres per Capita per Day |
| M&E | Monitoring and Evaluation |
| MAT | Ministry of Territorial Administration |
| MCSC | Municipal Council for Social Inquiry & Consultation |
| MDG | Millennium Development Goals |
| MINAMB | Ministry of the Environment |
| MINEA | Ministry of Energy and Water |
| MINED | Ministry of Education |
| MINFAMU | Ministry of Family Affairs and Women's Promotion |
| MINPLAN | Ministry of Planning |
| MINSA | Ministry of Health |
| MoGeCA | Community Management Model for Water Supply *(Modelo de Gestão Comunitária de Água)* |
| NGO | Non-governmental Organization |
| NRWSSP | National Rural Water Supply and Sanitation Programme |

| | |
|---|---|
| O&M | Operation and Maintenance |
| ODF | Open Defecation Free |
| OGE | State Central Budget (*Orçamento Geral do Estado*) |
| OJT | On-the-Job Training |
| OMA | Angola Women's Organization |
| OPEX | Operational Expenditures |
| PAISAS | Institutional Support Programme for the Water and Sanitation Sector |
| PAT | Water for All Programme (*Programa Água para Todos*) |
| PCN | Programme Concept Note |
| PCS | Post-Construction Support |
| PCSC | Provincial Council for Social Inquiry & Consultation |
| PDISA | Water Sector Institutional Development Project |
| PDSA | Water Sector Development Programme |
| PHAST | Participatory Hygiene and Sanitation Transformation |
| PIP | Public Investment Plan |
| PMU | Project Management Unit |
| PPP | Public-Private Partnerships |
| PV | Photovoltaic |
| PWC | Provincial Water Company |
| QA/QC | Quality Assurance / Quality Control |
| RWSN | Rural Water Supply Network |
| RWSS | Rural Water Supply and Sanitation |
| SADC | Southern African Development Community |
| SISAS | Water and Sanitation Sector Information System |
| STLC | Community-Led Total Sanitation *(Saneamento Total Liderado pela Comunidade)* |
| STLE | School-Led Total Sanitation *(Saneamento Total Liderado pelas Escolas)* |
| TA | Technical Assistance |
| ToR | Terms of Reference |
| UNDP | United Nations Development Programme |
| UNFPA | United Nations Population Fund |
| UNICEF | United Nations Children's Fund |
| UNIGEP | Heritage Management Unit (*Unidade de Gestão do Património*) |
| UO | Budget Unit (*Unidade Orçamental*) |
| USD | United States Dollars |
| UTNSA | National Technical Unit on Environmental Sanitation |
| VFM | Value for Money |
| WASH | Water Sanitation and Hygiene |
| WHO | World Health Organization |
| WRM | Water Resource Management |
| WSS | Water Supply and Sanitation |

# 1 INTRODUCTION

## 1.1 Background

The Government of Angola (GoA) endeavours to undertake a comprehensive national rural water supply, sanitation and hygiene programme, described by the acronym NRWSSP. Under the leadership of the Ministry of Energy and Water's National Directorate of Water (MINEA/DNA), a process is underway to develop the NRWSSP, drawing from lessons learnt from the Water for All Programme (PAT) and other post-conflict activities in the sector, as well as from successful national programmes and projects from around the region and from around the world.

The process for designing the NRWSSP unfolded over a three-year period, co-funded by the GoA and the African Development Bank through the Sumbe Water Supply, Sanitation and Institutional Support Project. It is intended to achieve substantive progress towards the national goals for sustainable water supply and sanitation service provision to the rural population. Cowater International Inc., in partnership with Development Workshop and R.J. Burnside, has been contracted to assist MINEA/DNA in the development of the NRWSSP. The consultants have liaised where relevant with DNA's technical assistance team under the PAISAS programme.

The NRWSSP consultancy has produced a Phase 1 report and a Phase 2 report. The Phase 1 report[1] provided an analysis of: the Angolan policy and legal environment; current principles, strategies, practices and experiences in rural water supply and sanitation; the sub-sector's capacity building needs; and the performance monitoring and information management system. It then proposed a general framework for the NRWSSP, including proposed policy reforms, overarching programme principles and approaches, and an implementation strategy. The Phase 2 report includes a full Operations Manual, sample project designs, the investment plan, an initial programme schedule, and a draft project concept note.

## 1.2 Summary of the NRWSSP

The NRWSSP will be executed in three stages:

- Phase 1 (2014 – 2018): Pilot phase in Uíge, Lunda Sul and Huambo provinces;
- Phase 2 (2019 – 2022): National implementation roll-out to remaining provinces; and
- Phase 3 (2023 – 2026): Full national implementation.

Lessons learnt from the pilot provinces will be incorporated as quickly as possible into the remaining provinces. Phase 2 is expected to mark the national roll-out of the full contingent of the provisions of the NRWSSP.

Over 3.6 million rural residents in selected locations are expected to benefit from the Programme through new or improved water supplies, while approximately 5.3 million will benefit from the promotion of sanitation and hygiene. Specific goals through 2026 include the following: (i) increasing rural drinking water and sanitation coverage to around 80% and 65%, respectively; (ii) improving water system functionality rates to around 90%; (iii) increasing operation and maintenance cost recovery to an average of nearly 100%; and (iv) obtaining a functioning rate of at least 80% for Water and Sanitation Management Groups (community-led or private sector). Subsequent sections in this report provide year-by-year

[1] Key results from the Phase 1 report can be found in Annex D.

estimates for new users benefited with water supply services, summarized by Phase as follows:

- Phase 1 (2014 – 2018): 1.288M new users;
- Phase 2 (2019 – 2022): 1.270M new users; and
- Phase 3 (2023 – 2026): 1.060M new users.

The Programme has been designed not only to extend access to improved water and sanitation services, but also to ensure that those services are reliable and sustainable, delivered at a reasonable cost and in an equitable fashion.

NRWSSP management will be performed initially by a Project Management Unit (PMU) located within MINEA/DNA. The implementation functions of the PMU will be transitioned to a national investment instrument (either an existing or new fund) for Phase 3, allowing DNA to concentrate on its core responsibilities of sector planning and policy-making. No significant changes to the sector institutional framework are proposed under the Programme, rather the strategy resides in strengthening existing institutions, their processes and their staff.

The key elements of the NRWSSP align with existing sector principles and policies that have not as yet been fully conceptualised and regimented, include the following:

- Concurrent implementation of water supply, sanitation, and hygiene components;
- Application of the Demand-Responsive Approach (DRA) which greatly expands community involvement and commitment;
- Widespread implementation of the Community Management Model for Water Supply (MoGeCA) approach in all its facets;
- Development of the domestic private sector to include greater participation in sanitation infrastructure delivery and in water service operation and maintenance;
- Direct implementation by municipal governments;
- An intensive capacity building programme, especially at the municipal level;
- Improved infrastructure quality brought about by the development and application of new standards and norms, implementation and supervision rules, and contract management procedures;
- Application of transparent project selection criteria expected to result in more efficient, effective and equitable resource allocation;
- Increased attention to post-construction operability of infrastructure;
- Refinement of the sector's performance monitoring system for rural water, sanitation and hygiene (WASH); and
- Improved communications, accountability, and information exchange amongst stakeholders.

The NRWSSP will concentrate its efforts on rural areas, while designating a low percentage of investment funding (10%-20%) for works and activities in small urban centres such as *comunas* and minor municipalities. Provincial capitals and their peri-urban areas will be ineligible to participate, as will most municipal seats. This is meant to ensure that core rural areas capture the majority of investment, and also to support the emerging GoA decentralisation strategy. Individual communities will be selected and prioritised based upon the demand-responsive approach and in-line with municipal planning methodologies and per capita cost limits for both construction and long-term operations.

Funding will be available for a range of purposes including new service provision, existing service rehabilitation and expansion, capacity building and training, source water protection,

policy development, knowledge creation and dissemination, and management activities. Routine operation and maintenance activities will be ineligible for funding. The Programme will develop a complete list of what qualifies and what does not qualify for funding, and at what levels.

The NRWSSP incorporates multiple lessons learnt from the PAT Programme, including: (i) the realisation that the domestic private sector is able to quickly expand to new geographic zones and adopt new technologies; (ii) the importance of close supervision of design and construction activities; (iii) the critical importance of preparing GAS and local governments to assume their roles in water supply operations and maintenance; (iv) successful implementation of photovoltaic pumped systems; (v) the failure of package treatment plants in the rural context; and (vi) the continuing challenge of spare part provision to ensure sustainable hand pumps, amongst others.

New subsector tools and strategies will be prepared and implemented, such as: (i) rural water and sanitation norms and standards; (ii) a set of subsector performance indicators and benchmarks; (iii) a comprehensive capacity building plan; (iv) the demand-responsive approach; (v) tariff and subsidy guidance; (vi) information management mechanisms; (vii) sanitation marketing as a complement to Community Led Total Sanitation (STLC); (viii) instruments for achieving improved communications, transparency and accountability of all stakeholders; (ix) an alternative private sector water supply management model; and (x) post-construction support models.

Local government will serve as the NRWSSP fulcrum, in-line with the national decentralisation strategy. Given the overwhelming need for improved capacity at all levels, one technical assistance team will be mobilised to meet the needs of the national and provincial levels, and others will be installed in each pilot province to support the building of local capacity in the public and private realms, with special emphasis on municipal governments.

The cross-cutting themes of gender equality, healthy environments, and social equity are essential to sustainable water supply and sanitation services and will remain as constant foci of the Programme.

Programme management will fall to MINEA/DNA supported by two executive elements: (1) an Annual Stakeholder Forum (ASF); and (2) a Programme Management Unit (PMU) within DNA/MINEA. MINEA will retain executive authority over the Programme as the relevant budget unit, possessing ultimate authority over key issues such as senior staff assignments, and critical programme decisions. The ASF will exercise annual programme oversight, without holding decision-making prerogatives.

At the operational level the Programme includes the following elements: (1) the PMU with both national and provincial offices; (2) a national Technical Review Team; and (3) Provincial Oversight Groups, these latter two expected to provide an open space for dialogue and the generation of recommendations for improving Programme efficiency and effectiveness from multiple perspectives, with a focus on perfecting the Programme for national roll-out.

Overall programme costs are estimated at USD 1013.5M (present value: USD 471.8M) over this period, including capital investment, sanitation & hygiene promotion, capacity building, monitoring & reporting costs, as well as programme management components. Programme total costs by phase are as follows.

- Phase 1 (2014 – 2018): USD 267.9M (present value: USD 189.0M);
- Phase 2 (2019 – 2022): USD 487.5M (present value: USD 216.8M); and
- Phase 3 (2023 – 2026): USD 258.1M (present value: USD 66.0M).

# 2 PROGRAMME OBJECTIVES & TARGETS

The objective of the NRWSSP is to expand access to sustainable water supply and sanitation services to rural households in accordance with the proposed numerical targets and national quality standards. The Programme's pilot phase (Phase 1) is designed to: (i) develop and introduce models, mechanisms, and methodologies in the areas of planning, finance, project execution, service provision operations and management, and post-construction support, geared towards improving implementation efficiencies and service operability; and (ii) strengthen institutional and human capacities to develop policies and strategies, plan, execute, monitor, manage, evaluate, and coordinate activities in rural water supply, sanitation, and hygiene promotion.

The NRWSSP will insert itself within the Government of Angola's strategic planning structure and its existing set of progress indicators for water supply and sanitation access. These are described in Table 2.1, with the coverage target dates shown in parenthesis. Note that government strategic planning instruments are not fully consistent as to the national coverage targets or the timeframe for accomplishing them.

**Table 2.1: Estimated coverage and targets for access to water supply & sanitation services**

| SECTOR | | COVERAGE | | COVERAGE TARGETS | | | | |
|---|---|---|---|---|---|---|---|---|
| | | ACCESS (JMP-2012) | ACCESS WATER FOR ALL (2012) | MDG TARGET (2015) | COUNCIL OF MIN. RES. 10/04 (2016) | WATER FOR ALL (2012) | MPLA GOV. PLAN (2017) | NATIONAL ENVIRON. SAN. PLAN (2016) |
| WATER SUPPLY | RURAL | 34% | 53% | 70% | 70% | 80% | 80% | - |
| | URBAN | 68% | - | 69% | 67% | - | 100% | - |
| | TOTAL | 54% | - | 70% | 68% | - | 92% | - |
| SANI-TATION | RURAL | 20% | - | 55% | 65% | - | 80% | 65% |
| | URBAN | 87% | - | 78% | 85% | - | 100% | 85% |
| | TOTAL | 60% | - | 68% | 81% | - | 92% | 77% |

*Source: WHO/UNICEF Joint Monitoring Programme (2014); INE (2010); MPLA (2012); MINAMB (2012); Government of Angola (2004)*

In light of their publication in the Official Record, the NRWSSP adopts the Council of Ministers' Resolution 10/04 water and sanitation targets for rural areas of 70% and 65%, respectively. Nonetheless, the programme more realistically expects 2018 coverage levels for rural water supply on the order of 60%-65%, and for sanitation in the range of 40%-45%.

**Table 2.2: Proposed NRWSSP targets for key outcome indicators**

| TARGETS / KEY INDICATORS[(1)(3)] | PHASE 1 (2015-2018) | PHASE 2 (2019-2022) | PHASE 3 (2023-2026) |
|---|---|---|---|
| Outcome 1: Increased rural population with access to improved water supplies and sanitation | | | |
| *% of rural population within 500 m of an improved water source, delivering a minimum of 20 lpcd (2)* | 60% - 65% | 70% - 75% | > 80% |
| *% of rural population with access to improved sanitation (2)* | 40% - 45% | 50% - 55% | 60% - 65% |
| *Ratio of access of lowest to highest income quintile for water supply (2)* | 0.45 – 0.60 | 0.60 – 0.75 | > 0.75 |
| *Ratio of access of lowest to highest income quintile for sanitation (2)* | 0.40 – 0.50 | 0.50 – 0.65 | > 0.65 |

**Table 2.2: Proposed NRWSSP targets for key outcome indicators**

| TARGETS / KEY INDICATORS[(1)(3)] | PHASE 1 (2015-2018) | PHASE 2 (2019-2022) | PHASE 3 (2023-2026) |
|---|---|---|---|
| % rural population with access to both improved water supply and sanitation | 35% - 45% | 45% - 60% | 60% - 70% |
| Outcome 2: Increased rural population with improved practices in household water management, sanitation, and hygiene | | | |
| *% households with handwashing materials available in dwelling/yard/plot (2)* | 10% - 20% | 20% - 35% | 35% - 55% |
| % population practicing safe household water storage | 10% - 20% | 20% - 35% | 35% - 55% |
| % population open defecation free | 45% - 55% | 55% - 75% | > 90% |
| % of female users satisfied with school sanitation facilities | 50% - 65% | 65% - 75% | >75% |
| Outcome 3: Improved capacity of government and user groups to deliver and ensure sustainable rural WASH services and practices | | | |
| *% water schemes functioning at the time of survey (2)* | 75% - 80% | 80% - 90% | > 90% |
| *% schemes with actively functioning management in place - GAS or other (2)* | 50% - 65% | 65% - 80% | > 80% |
| *% GAS (if community managed) with women holding decision-making positions (2)* | 45% - 55% | 45% - 55% | 45% - 55% |
| *Average capital cost per capita for water supply (2)* | mean annual cost lower than in previous year when adjusted for inflation | | |
| % water supply schemes benefitting from post-construction support services | 10% - 25% | 25% - 40% | 40% - 60% |

*1) Requires agreement on values and definitions, as well as mechanisms for data collection, analysis, and use.*

*2) "Strategic" indicators are indicated in italics; remaining indicators are designated as subordinate.*

*3) See Operations Manual for select definition of terms and concepts used within the indicator set.*

The programme strategy emphasises managing as small a group of programme success indicators as possible, using regularly collected data. It is, nonetheless, essential that occasional subsector surveys will have to be undertaken in order to gather meaningful answers to questions involving GAS functioning, system functionality, user satisfaction, amongst others. Owing to its nature as a pilot programme, and due to the fact that subsector data in Angola have been scant over the previous decades, a NRWSSP baseline survey will be implemented.

As presented in subsequent sections, the achievement of these objectives implies that over 3.6 million rural residents in selected locations are expected to benefit from the Programme through new or improved water supplies, while approximately 5.3 million will benefit from the promotion of sanitation and hygiene.

# 3 INSTITUTIONAL DEVELOPMENT PLAN

## 3.1 NRWSSP organisational structure

The NRWSSP is not initiating significant administrative or organisational restructuring. Institutional and administrative reform efforts typically require legislative mechanisms, coupled with significant investment and political leadership for implementation. The use of the PMU obviates in large measure the need to engage in structural, institutional reform. Nonetheless, the Programme will attempt to operationalize several relevant principles and policies, especially with regards to changing institutional roles and responsibilities. Table 3.1 highlights the major institutional arrangement modifications expected under the NRWSSP during Phase 1. Later Programme phases may witness additional institutional reform in line with the on-going decentralisation process, PDISA implementation, and other unforeseen reform efforts, though no additional institutional modifications are planned as part of Programme implementation.

**Table 3.1: Key institutional reforms under the NRWSSP**

| INSTITUTION | INSTITUTIONAL REFORMS ACCOMPANYING NRWSSP | SOURCE OF REFORM |
|---|---|---|
| DNA | • Direct implementation role curtailed<br>• Technical assistance and capacity building role emphasised<br>• Monitoring, evaluation, and reporting roles clarified and enhanced | PDSA |
| DPEA | • Direct implementation role curtailed<br>• Technical assistance and capacity building role emphasised<br>• Monitoring, evaluation, and reporting roles clarified and enhanced | PDSA |
| MINAMB / DNA | • Significant coordination required amongst lead agencies and implementers in order to achieve integrated water, sanitation, and hygiene outcomes | Environmental Sanitation Policy / PDSA |
| Municipal Government | • Demand generation and implementation role assumed by municipal government<br>• BMEAs instituted and operationalized<br>• Delegation of operation and maintenance tasks to the domestic private sector<br>• Monitoring, evaluation, and reporting roles clarified and enhanced | MoGeCA and PDSA |
| GAS / Communities | • Programme driven by community demand for services, not by government supply of services<br>• MoGeCA fully implemented<br>• Private sector service operations included as an option<br>• Post-construction support services available | MoGeCA and PDSA |

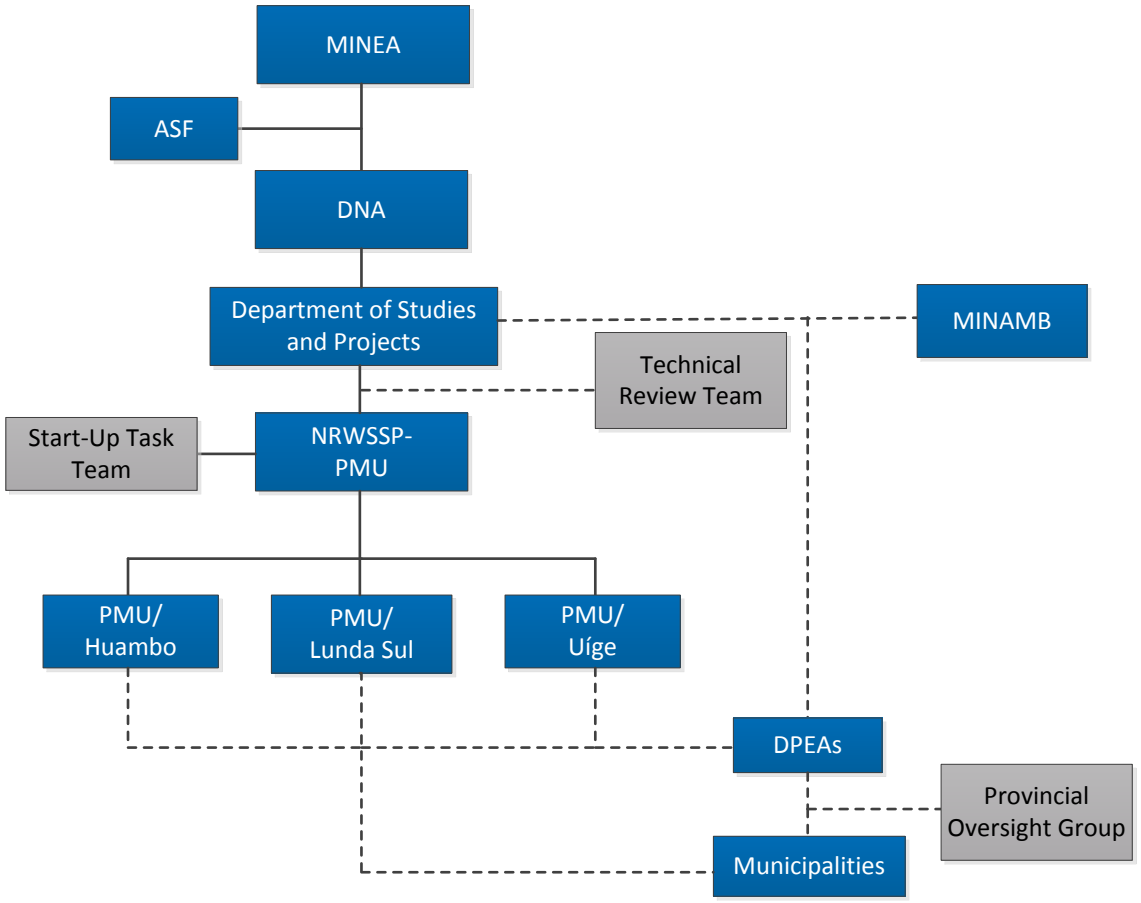
### 3.1.1 Programme direction and management

The NRWSSP is a Government of Angola initiative designed both as a stand-alone programme and as a national pilot activity whose goal is to generate lessons learned for ensuring sustainable, quality, cost-effective water supply and sanitation solutions primarily for rural areas. In light of this dual role of infrastructure implementation and learning laboratory, the programme requires a unique structure.

The Programme is designed for insertion administratively within the Ministry of Energy and Water's (MINEA) National Directorate for Water (DNA). This location has been selected considering the fact that MINEA/DNA is responsible for national water supply policies, and programme management for investments in urban water, urban sanitation, and rural water supply. MINEA/DNA is, therefore, seen as best positioned for the generation, integration, and dissemination of lessons learned through the use of policy tools and its pre-established lines of authority and communication.

The Programme proposes to initially operate through a Project Management Unit (PMU) located within DNA. The PMU will be staffed in accordance with the final resource envelope, including a mix of long-term appointments that would incorporate both national and international elements (including some current government staff), and rotational, short-term appointments held primarily by existing staff from the provinces. Specific functions will be retained by existing MINEA and DNA departments, and by private contractors, with day-to-day programme supervision and control located within the PMU.

**Figure 3.1: NRWSSP organisational arrangement schematic**




The PMU itself will report to existing senior management at DNA, who in turn will report to MINEA, and to an Annual Stakeholder Forum (ASF). The ASF is expected to be composed of a small number of key stakeholders representing MINEA, the Ministry of the Environment (MINAMB), the Ministry of Health (MINSA), the Executive, the Ministry of Territorial Administration (MAT), civil society and private sector organizations active in WASH as well as development partners. DNA would act as executive secretary, while MINEA would be responsible for organising the annual forum. The ASF's primary role is to provide programme monitoring and guidance. It is not designed to have specific programme powers of decision, though it is clearly an important political tool that can be used to shape the

Programme to conform to emerging national strategies and trends. More specifics as to the responsibilities, composition, and other characteristics of the ASF would be drafted by the PMU and finalized by MINEA. Figure 3.1 depicts the general Programme organisational arrangement.

The PMU is expected to maintain a primary office in Luanda, while fielding technical assistance (TA) teams in each of the three Programme provinces of Uíge, Lunda Sul, and Huambo. Ideally these TA teams would be housed within the Provincial Departments of Energy and Water (DPEA), though not accountable to the provincial government. All but the most complex of project activities would be managed directly by municipal governments, with the Provincial Departments of Water and Energy directly managing a few complex projects, and the PMU in Luanda managing any works or activities demonstrating extreme complexity.

The PMU's primary functions include the following: (i) overall Programme management; (ii) annual and multi-annual Programme planning including budgeting; (iii) technical and administrative support to the provinces and municipalities; (iv) management of the Programme's capacity building and training component; (v) occasional direct implementation of extremely challenging activities in the provinces; (vi) Programme performance monitoring and quality control; (vii) reporting to Programme funders and partners; (viii) providing public information; (ix) management of the Programme's learning and dissemination activities, including direct implementation of select initiatives; (x) review of contracts and supervision of expenditures for quality assurance; (xi) participation in regional, national, and international forums relating to pilot or demonstration activities; and (xii) other related activities assigned or developed over the life of the PMU.

The PMU provincial presence will include a small administrative team partially seconded from the DPEA or other relevant government agencies, and a technical assistance team tasked with monitoring progress, ensuring that Programme activities are performed in line with established guidelines, and with leading the capacity building and training component directed towards the provinces, municipalities, domestic private sector, and other local stakeholders, including communities. A proposed staffing plan is included in the Operations Manual, and may require adjustments in-line with the final, approved Programme budget.

There is a sensible balance to be achieved such that technical assistance does not assume the roles of local agents, and that local agents do not ignore the monitoring or guidance offered by the technical assistance. The NRWSSP must be repeatedly promoted as a new approach that will take time to adequately implement, requiring patience and mutual support amongst the stakeholders.

An *ad hoc* Start-Up Task Team would be formed by MINEA for the purpose of preparing managerial staff ToRs, handling the NRWSSP manager and senior manager selection processes (including assisting with the selection of the manager), and providing support to the NRWSSP and its manager until the PMU can function independently. Additionally, a Technical Review Team will provide occasional feedback to the Programme at the national level, and Programme Oversight Groups will be formed at the provincial level for similar purposes. Details on these teams and their responsibilities can be found in the Operations Manual. In addition, a start-up consultant will be hired to assist the Start-Up Task Team with their responsibilities.

### 3.1.2 Programme financing

It is expected that the initial phase of the NRWSSP will be financed by the GoA as well as Development Partners. MINEA/DNA already has considerable experience operating PMUs, and that experience will be invaluable in putting the required systems in place to create an

effectively-functioning unit. Ensuring reliable and efficient financial management and fund flows will be critical to Programme optimisation.

In the case of AfDB and GoA funding, financial management directives and rules are already in place and well-understood by the partners. This report seeks to identify financial flow issues specific to the NRWSSP. Of note is the fact that two ministries have key roles in the programme – MINEA and MINAMB – and both are slated to receive programme funding to meet their individual responsibilities. Mechanisms will need to be put in place that will ensure that required funds arrive when needed at their destinations, while ensuring consolidated monitoring and reporting.

In addition, Programme funds will be directed towards multiple municipalities and provinces, each of which may be implementing the Programme using a mixture of funding sources. Care will need to be taken in the design of the financial monitoring instruments. Similarly, decisions will have to be made about how to transfer funds to Programme sub-offices, and to what extent Programme-related expenses generated at the provincial or municipal levels will be financed[2]. Some relevant suggestions on these topics are included in the Operations Manual.

Of concern in any infrastructure project is the fact that governments characteristically operate under an annual planning and financial year, with funding windows opening and closing according to an established schedule. The Programme must explore with the Planning and Finance Ministries the possibility of allowing for more flexible planning, implementation, and reporting of funds that are dedicated to water and sanitation infrastructure at the municipal level. For example, multi-annual contracts for construction, social mobilization, or management can result in significant economies of scale (and scope), but may not be convenient under existing budget and finance rules. Construction and community mobilization activities in rural areas are also highly dependent upon weather conditions (affecting access) and the agricultural calendar (affecting community participation), making it challenging at times to complete projects within a single fiscal year.

Similarly, should municipal governments decide to work jointly in the rural WASH subsector, new rules and approaches to planning, finance, and reporting will have to be developed[3].

It is envisioned that eventually the NRWSSP funding will transition from the PMU to a national fund. Ideally, performance criteria should be applied when prioritising access to the fund – for example, municipalities with higher rates of functioning infrastructure or higher levels of budget execution should have access to a higher percentage of the available funds. Dialogue with the Ministries of Planning and Finance, as well as with the executive can help shape the future criteria for rural water, sanitation, and hygiene funding allocation. The concept of performance-based funding also needs to be explored from the outset with municipal and provincial authorities.

Funding for rural WASH is expected to continue through both existing and future channels[4]. The NRWSSP is not meant to subsume every existing or future programme or initiative that

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[2] For example, will the Programme finance municipal staffing costs for the BMEAs or administrative support roles, and if so, to what degree and for what period of time? The draft Programme budget provides one scenario, however, the Programme may opt for other options once the Programme gets underway.

[3] For example, smaller municipalities might decide to form municipal consortia for the purpose of managing WASH activities on a regional basis. In this way, municipalities might jointly have the resources to hire an engineer, or fund a multi-municipal management contract with a private operator or post-construction support agent, or contract out annual monitoring activities. This model would need to be designed and tested.

[4] The PAT Programme is expected to continue outside the NRWSSP pilot provinces during Phase 1.

might provide funding or technical assistance. It is likely that multiple funding sources and projects will appear and ebb over time from sources that might include the national public investment budget, national or regional development funds, district/municipal programmes, donors and lending institutions, and private sources (including NGOs, CBOs, private sector firms and entrepreneurs, communities themselves, etc.). For these existing and potential sources of funding and support the NRWSSP constitutes the template they must follow in their efforts to provide or sustain rural WASH services.

The NRWSSP is designed to eventually separate its financial role from its programmatic role, creating a funding mechanism to accompany the programmatic approach that would remain under the tutelage of MINEA and MINAMB in their respective areas of responsibility. The financial mechanism is projected to function as a pool fund, however, it is not mandated to absorb all subsector funding. This is known as the classic programmatic approach whereby the state mandates the policies, approaches, methodologies, standards, and other common characteristics of intervention in the subsector, while funding agencies are free to establish their specific operational guidelines as long as they fall under the national programme.

As an example, the current Water for All Programme (PAT) could: (i) continue to operate under its current structure, incorporating over time the NRWSSP rules and guidelines; (ii) fully merge its assets (close as a separate programme) into the NRWSSP during either Phase 1 or 2 of its operations; or (iii) restructure itself in some other manner, such as by becoming a multi-region programme.

On the topic of procurement, it is proposed that until the GoA completes its on-going state-procurement reform process, interim procedures should be established. It is suggested that these interim procurement procedures be harmonized to satisfy the existing procedures of relevant Development Partners who may participate in the programme. These include standard bidding documents, contract clauses, and procedural manuals. If by the end of Phase 1 the GoA reform process has been satisfactorily completed, the Programme can transition to the official state procurement system. Financial management, accounting, and audit functions will similarly be handled during Phase 1 through the PMU using Development Partner rules and conditions, where possible.

On a related note, it is well understood that infrastructure projects funded in part through the international development banks suffer on occasion from delays due to longer than expected approval processes. It is highly recommended that the Programme closely monitor and document any budget or tender processes that involve multiple layers of approvals or reviews, with an eye towards avoiding unnecessary delays and generating suggestions for streamlining any protracted procedures.

### 3.1.3 Programme implementation and process monitoring

The NRWSSP recognises that institutions and jurisdictions will start the Programme from disparate initial conditions. For example, some provinces and municipalities may already have had experiences with direct project implementation as part of the PAT programme or have long-running projects with donors or NGOs, and have built a considerable knowledge base for rural WASH programming. The baseline situation of each Programme participant, therefore, needs to be clearly established from the outset (or earlier if pre-implementation funding can be obtained).

In support of this purpose Municipal Readiness for WASH assessments (see the Operations Manual, have been developed for application annually in all participating municipalities. Along these same lines, there is also an NGO and private sector scanning tool in the case of water supply. Used together, these instruments should provide the basis for annual guidance to Programme partners on existing local capacity to intervene in the subsector, as well as

areas where capacity building efforts are most needed. With this information in hand, the Programme will be better able to plan and schedule activities and works, and respond to the specific needs of individual organisations.

Implementing partners will need to meet minimum standards of administrative and managerial capacity as a pre-requisite for project implementation. The Programme expects to set minimum criteria for: (i) staffing; (ii) knowledge levels of relevant staff; (iii) tendering and contract management; (iv) monitoring and information management; (v) planning processes; (vi) communications and community outreach; (vii) and physical and material readiness (for example, transportation access, availability of basic office supplies and administrative and supervisory tools). The Operations Manual suggests an initial set of minimum standards for implementers, that should, however, be reformulated and updated once the Programme gets underway.

Implementation itself will require its own set of performance measurement tools. Since the Programme goal is not merely a physical one (improved, sustainable access to water supply and sanitation services, as well as the development of competent implementation capacity), there is a critical need for appropriate process monitoring in order to rapidly identify successes and failures, strong and weak methodologies or execution, and efficient and inefficient processes and results. Data and information must therefore be collected and rapidly analysed both by implementers themselves, but also by Programme staff and technical assistance at the provincial and national level. Excessive data collection will be avoided by establishing a few, key standards and performance benchmarks. A proposed methodology and an initial set of process indicators are provided in the accompanying Operations Manual. Rural WASH services monitoring and reporting are treated in a later chapter of this report.

### 3.1.4 Stakeholder forums

The NRWSSP serves as a demonstration project during its initial four-year period, and as such requires the creation of appropriate forums for information sharing and reporting both for internal and external clients. It is proposed that each participating province and DNA at the national level institute regular informational and knowledge transfer meetings, as often as twice annually in the provinces, and at least annually at the national level. In addition, an annual informational meeting with all the provinces (participating and non-participating) should be held as a way of keeping the subsector up-to-date on progress, initial findings, and lessons learned. In this way, once the Programme is expanded nationally, the rural WASH community will already be familiar with many of the new approaches, methodologies, and models being implemented. Table 3.2 lists major fora and dissemination mechanisms.

Any approved new tools or approaches should immediately be communicated to relevant implementing agents such as government programmes and projects, provincial and municipal authorities, NGOs and the private sector. A communications and dissemination strategy outline covering this and other topics is described more fully in the Operations Manual, nonetheless, an annual communications plan will be developed by the Programme to better reflect and respond to partner needs and subsector conditions.

It is incumbent upon the sector, in a parallel effort, to convene an annual sector review exercise in line with current global best practice. Any annual sector review, however, would originate with the key ministries, not with the Programme. The Programme could assist DNA and MINAMB in the preparation of their respective rural WASH subsector analyses and reporting. Similarly, each province, led by their respective DPEA, should consider holding an annual WASH roundtable event for sector planning, information sharing, and capacity building purposes. See Section 7 on monitoring and reporting in this report for additional details.

**Table 3.2: Key NRWSSP forums and dissemination mechanisms**

| FORUM | PRIMARY OBJECTIVES | DETAILS |
|---|---|---|
| Annual Stakeholder Forum (ASF) | In-depth review and analysis of Programme execution against plan in terms of quantity and quality. Opportunity to suggest Programme modifications and explore emerging subsector reform implications. | Annual in-depth Programme review workshop of at least two days' duration. |
| NRWSSP Regular Programme Execution Workshop (National level) | Dissemination of key Programme results and lessons learned. Opportunity to engage in technical and emerging policy options discussions. | Annual performance monitoring and informational workshop primarily for national stakeholders. Held prior to ASF meetings. At least one day in duration. |
| NRWSSP Regular Progress Report Meeting (Provincial Level) | Dissemination of key Programme results and lessons learned at the provincial and municipal levels. Opportunity to engage in technical discussions and identify emerging policy concerns. | Semi-annual performance monitoring and informational workshop primarily for provincial and municipal stakeholders (one per province). One held immediately prior to the National Workshop. At least one day in duration. |
| Dissemination event for interested parties | Dissemination of key Programme results and lessons learned. Opportunity to engage in technical discussions and identify emerging subsector concerns. Provide a springboard for eventual Programme roll-out. | Annual event coming after the ASF meetings. At least one half day in duration. |
| Other reporting mechanisms | Provide a springboard for eventual Programme roll-out. Provide subsector with heightened visibility. Educate the public. | Might include the release of occasional reports and studies, maintenance of a Programme web site, hosting of sporadic topical events, Programme site visits, mass media releases, among others. |

### 3.1.5 Evolutive character of the Programme

The Programme strategy involves a transitioning by year nine of the NRWSSP from an investment and institutional strengthening programme managed directly by MINEA/DNA, to a national RWSS investment fund managed from outside the sector, although MINEA/DNA would continue to provide rural WASH leadership. This strategy aims to utilise the Programme to develop the capacity and tools needed to guide the rural subsector towards clarity of purpose, self-sufficiency, sustainability, and the delivery of quality services. Once the subsector institutions and processes are adequately strengthened, investment can be handled through a more efficient mechanism such as an investment fund at either the national or regional level.

In order to accomplish such a transition a roadmap will be developed by the PMU during the Programme's initial 36 months of operation. The roadmap would include specific targets and milestones for measuring progress and staying on-track.

Other Programme aspects demonstrate a flexible and evolutive approach, as described in Table 3.3.

**Table 3.3: Key evolutive aspects of the NRWSSP**

| ASPECT | EVOLUTIVE APPROACH |
|---|---|
| Finance model | The Programme begins as a MINEA/DNA managed pilot programme in three provinces, becoming a national programme during Phase 2, and transitioning into a national rural WASH fund by Phase 3 managed from outside the Ministry. |
| Project selection and prioritisation | Project selection and prioritisation becomes increasingly dependent upon community self-selection and initiative, as well as the results of participating municipalities whereby the more efficient and effective implementers are given some preference for financing, especially in the latter years of the Programme. |
| Project implementation | Municipalities are expected by year nine of the Programme to be implementing all projects within their jurisdictions. |
| Community mobilisation and post-construction support | Two parallel models are being developed and local governments will have the option of selecting whether or where to apply each one for community mobilisation, and post-construction support, including water service operation and maintenance by either the GAS group or a domestic private sector operator. |
| Miscellaneous | Multiple forums and opportunities become available for comment and discussion about Programme components, tools, mechanisms, and results, and these are expected to have a positive and ever-widening influence over the Programme and the subsector. |

### 3.1.6 Functional analysis - stakeholder roles and responsibilities

The NRWSSP is designed to adopt the legal and institutional frameworks and policies recently instituted in Angola as they pertain to the rural subsectors. For a variety of reasons these new elements have not yet been widely applied due in part to institutional inertia, a lack of project funding, and in some cases a lack of tools for their application, including the following:

- MoGeCA;
- The Regulatory Framework for Rural Water Supply;
- The laws surrounding local governance;
- Training and capacity building at all levels; and
- STLC and other sanitation and hygiene methodologies.

The NRWSSP integrates these elements (and others) and will test them exhaustively under the divergent conditions found in the three pilot provinces. The Operations Manual describes the specific approaches for incorporating these new elements and identifies some likely constraints for doing so along with proposed responses to the constraints identified.

In accordance with the existing administrative laws and regulations, and in-line with the recently proposed regulatory framework, the tables below attempt to clarify the roles and responsibilities of the primary Programme stakeholders at all levels. It is evident that the three key elements are DNA, DPEA, and the municipal governments. The DPEA is shown as having primary responsibilities for certain activities directly related to works such as financing, design, and construction. It must be clearly understood that this particular role is a provisional one, activating only in the cases where municipal governments prove to be incapable of performing these tasks in the near term.

The private sector is also shown as having multiple roles, though some of these, such as in operation and maintenance, community mobilisation, and post-construction support will require significant capacity building and the development of insertion points for their participation in these new areas.

### 3.1.7 Risks and challenges

There are multiple risks and challenges associated with the NRWSSP. Table 3.4 explores some of the key issues related to the administrative structure of the Programme that will need to be analysed and resolved.

**Table 3.4: Risks and challenges associated with NRWSSP administrative arrangements**

| ADMINISTRATIVE ARRANGEMENTS RISKS | DEGREE OF RISK | RISK MITIGATION STRATEGIES / ACTIONS |
|---|---|---|
| PMU unable to insert itself successfully into DNA/DPEAs; DNA/DPEA staff reticent to undertake new roles as defined under the NRWSSP | Med. | • PMU/TA to include seconded DNA/DPEA staff, possibly on a rotating basis;<br>• DNA/DPEA staff provided with intensive technical training and opportunities for temporary learning assignments;<br>• Per diem and other official payments ensured for all DNA/DPEA staff whilst engaged in Programme activities;<br>• Office equipment, materials, and transportation are made more accessible under the Programme. |
| Municipalities and Provinces execute Water for All projects in same areas as the NRWSSP diluting the intended impact of new approaches | Med. | • MINEA and the Governor's office arrange to limit PAT interventions to areas where the NRWSSP will not intervene;<br>• Provincial and Municipal authorities engage in regular coordination and informational meetings concerning the new approaches of the NRWSSP. |
| The weak links of MINAMB to the provinces and municipalities, along with a limited working relationship with DNA may make it challenging to integrate water supply, sanitation, and hygiene activities | High | • Sufficient budget amounts allocated to MINAMB for funding its implementing agents in the field;<br>• Regular coordination meetings held amongst the key Programme implementing agents at the national, provincial, and municipal levels;<br>• The on-going participation of MINAMB and its local implementing partners in Programme-sponsored training activities is ensured. |

## 3.2 Capacity building

The terms "capacity building" and "institutional strengthening" are equivalent in this report, referring to the need for both adequate organisational governance and individual professionalization in order to optimise personal and collective performance.

For the purpose of this report we are adopting a framework that considers three key reference points for capacity building: (i) organizational structure; (ii) institutional systems; and (iii) human resources. These three aspects should be considered within the context of their specific institutional culture. An institution, for example, that routinely hires individuals for technical positions based primarily upon their political or family contacts is not likely to benefit from typical institutional strengthening programmes. Similarly, an organisational culture that does not value accountability may hinder attempts to institute transparent systems.

This report takes the position that institutional culture change cannot be adequately addressed under the design of the NRWSSP, therefore, the capacity building efforts prescribed here can only serve as a guide for improving institutional performance.

It bears mentioning that both the consultancy to design the NRWSSP and the long-term DNA technical assistance team (DNA-TA) have been charged with assisting in the

development of a national capacity building strategy and plan. The NRWSSP design team concentrated its efforts on the rural subsector and has borrowed from the initial conceptual framework already put forth by the DNA-TA team. This section, therefore, reflects the current thinking of both teams, under the guidance of DNA.

### 3.2.1 Organisational structure

The information contained in Table 3.6 and Table 3.7 focus attention on the need for capacity building in relation to current, new, and expanded roles under the NRWSSP. In response, the capacity building effort will concentrate on those institutions that: (1) bear the majority of the core responsibilities at each operational level (DNA, DPEAs, and the municipalities); (2) experience the greatest degree of change in responsibilities (the municipalities, the DPEAs, and the domestic private sector); (3) may be completely new (BMEAs); or (4) perform roles that no one has effectively performed in the past or need to implement completely new approaches (such as community mobilisation where the private sector, NGOs, and the municipalities are most likely to intervene moving forward using new models and approaches.) Table 3.8 describing the capacity building needs of the key Programme stakeholders, carefully considers these modified roles and responsibilities.

Changing implementation modes and roles that have been in effect for years is a central challenge for the NRWSSP and one of the primary reasons for Phase 1 taking place in only three provinces. Section 5 of the Operations Manual shows in more detail where the most significant institutional role changes will be expected: DNA (transitioning from implementing to normative agency; the DPEAs, transitioning from implementing to technical assistance agencies; and the district/municipal governments, transitioning from passive participants to central protagonists in rural WASH service delivery. Expanded analysis of the new roles for each of these three agents is provided in the sections highlighted in Table 3.5 below:

**Table 3.5: References to information on key stakeholder roles under the NRWSSP**

| STAKEHOLDER | TOPIC | REFERENCE |
|---|---|---|
| DNA | • NRWSSP implementation<br>• PMU creation and management<br>• Capacity building<br>• Institutional roles<br>• Sanitation and hygiene<br>• Monitoring and reporting | • Annex E, Operations Manual<br>• Table 3.2, E1, E2, Ops Manual<br>• Section 5.4.4, Ops. Manuals; Table 3.7<br>• Section 5.2, Ops. Manual<br>• Figure 6.1, Ops. Manual<br>• Section 7.2, Figure 7.1, Ops. Manual |
| DPEA | • DPEA-led activities<br>• Institutional roles<br>• Capacity building<br>• Sanitation and hygiene<br>• Monitoring and reporting | • Annex E, Operations Manual<br>• Section 5.2, Ops Manual<br>• Section 5.4.5, Ops. Manual; Table 3.7<br>• Figure 6.1, Section 6.3, Ops Manual<br>• Section 7.2, Figure 7.1, Ops. Manual |
| Districts / Municipalities | • Municipal-led activities<br>• Institutional roles<br>• DRA Implementation<br>• Capacity building<br>• Post-Construction Support<br>• Sanitation and hygiene<br>• Monitoring and reporting | • Annex E, Operations Manual<br>• Section 5.2 Operations Manual<br>• Section 4.3, Operations Manual<br>• Section 5.4.6 Ops. Manual; Table 3.7<br>• Section 4.4, Ops. Manual<br>• Figure 6.1, Section 6.3, Ops. Manual<br>• Section 7.2, Figure 7.1, Ops. Manual |

**Table 3.6: Stakeholder functional analysis of NRWSSP by administrative level**

| STAKEHOLDER (1) | PLANNING & DEMAND IDENTIFI-CATION | M&E, INFOR-MATION MGMT | FINANCING | POLICIES & STANDARDS | COMMUNITY MOBILIZ-ATION | REGULATION | DESIGN & CONSTRUC-TION | CONSTR-UCTION SUPERV. | POST-CONSTRUC-TION SUPPORT | TA & CAPACITY BUILDING | COMMUN-ICATION & COORD. | O&M & MANAGE-MENT (2) | SOURCE WATER PROTECTION | RESEARCH | TARIFF SETTING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NATIONAL LEVEL** | | | | | | | | | | | | | | | |
| Annual Stakeholder Forum | Programme Oversight | | | | | | | | | | | | | | |
| MINEA | ● | ● | ● | ● | | | | | | | ● | | | | ● |
| DNA / PMU | ☐ | ☐ | ☐ | ☐ | | | | | | ☐ | ☐ | | | ☐ | ● |
| MINAMB | ● | ● | | ● | | | | | | ● | ● | | | ● | |
| MAT, MAPESS, MINSAL | ● | | | ● | | | | | | ● | ● | | | | |
| MINFIN, MINPLAN | ● | ● | ● | | | | | | | | | | | | |
| INRH | | | | | | | | | | ● | | | ● | | |
| PAT | ● | | | | | | | | | | | | | | |
| NGOs | | | | | ● | | | | | ● | | | | ● | |
| Private sector | | | | | ● | | ● | ● | ● | ● | | | ● | | |
| Others | May include public or private actors, existing or soon-to-be-created entities, assuming listed or new roles/responsibilities. | | | | | | | | | | | | | | |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | | | |
| Governor's Office | ● | | ● | | | | | | | | | | | | ☐ |
| PCSC (4) | ● | | | | | | | | | | ● | | | | |
| DPEA | ☐ | ☐ | ☐ | ● | ☐ | ● | ☐ | ☐ | ● | ☐ | ☐ | | | ● | ● |
| Provincial Water Company (5) | To be defined | | | | | | | | | | | | | | |
| NGOs | ● | | | | ● | | | | | ● | | | | | |
| Private sector | | | | | ● | | ● | ● | ● | ● | | ● | | | |
| Others | May include public or private actors, existing or soon-to-be-created entities, assuming listed or new roles/responsibilities. | | | | | | | | | | | | | | |
| Private sector | | | | | ● | | ● | ● | ● | ● | | ● | | | |
| Others | May include public or private actors, existing or soon-to-be-created entities, assuming listed or new roles/responsibilities. | | | | | | | | | | | | | | |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | | | |
| Municipal Administration | ☐ | ☐ | ☐ | | ☐ | ☐ | ☐ | ☐ | ☐ | | ☐ | ☐ | ☐ | | ● |
| MCSC (4) | ● | | | | | | | | | | ● | | | | |
| Municipal Office of Energy & Water (5) | | ● | | | ● | | | | ● | ● | | ● | | | |
| EMEA (5) | | ● | | | ● | | | | ● | ● | | ● | | | |
| BMEA (5) | | ● | | | ● | | | | ● | ● | | ● | | | |
| Comuna Administration | ● | | | | ● | ● | | | ● | | ● | ● | | | |
| Traditional authorities | ● | | | | ● | | | | | | ● | | | | |
| GAS groups / Users | ● | ● | ● | | ● | | | ● | | | ● | ● | ● | | ● |
| NGOs | | | | | ● | | | | | ● | | | | | |
| Private sector | | | | | ● | | ● | ● | ● | ● | | ● | | | |
| Others | May include public or private actors, existing or soon-to-be-created entities, assuming listed or new roles/responsibilities. | | | | | | | | | | | | | | |

☐ - *Core responsibility*

● - *Assigned role or non-core function*

*(1) Where possible only one stakeholder should have "core responsibilities" for each activity at each level. As an example, GAS groups and BMEA's may collect data, but it is the municipal administration that is ultimately responsible for ensuring that the task is performed.*

*(2) Operation, maintenance, and management may also include repairs and expansion.*

*(3) It is envisioned that the Province will establish a Water Supply and Sanitation Roundtable, though not expressly linked to the NRWSSP.*

*(4) Provincial and Municipal Councils for Social Inquiry & Consultation (PCSC / MCSC)*

*(5) Stakeholders in lighter shade text may or may not exist in a specific jurisdiction.*

### 3.2.2 Institutional systems

The strategic reforms taking place under the Programme come in the form of changes to "systems" for the implementation of rural WASH programming. The most significant changes are highlighted in Table 3.7.

**Table 3.7: Changes in institutional systems for rural-WASH under the NRWSSP**

| ACTIVITY | METHODOLOGY | IMPLICATIONS |
|---|---|---|
| Project selection and prioritisation | DRA and new planning tools | Implementers need to familiarise themselves with new approaches, methodologies, and tools |
| Service operation and management | MoGeCA and PPP models | PPP model needs to be designed and tested;<br>Implementers (including the private sector) need to familiarise themselves with new approaches and methodologies |
| Post-Construction Support | MoGeCA and PPP models | PPP model needs to be designed and tested;<br>Implementers (including the private sector) need to familiarise themselves with new approaches and methodologies |
| Integrated implementation of water supply, sanitation, and hygiene promotion | Integrated project management approaches | Models need to be developed and tested for implementing integrated projects;<br>Implementers need to familiarise themselves with new approaches and methodologies |
| Technical assistance | Institutional support models | New institutional support models need to be designed and implemented between all levels;<br>Implementers need to familiarise themselves with new approaches, methodologies, and tools, and acquire new skills and competencies |

### 3.2.3 Human resources

The provision of sustainable rural water supply and sanitation services is the primary objective of the NRWSSP. Building sector capacity by developing human resources is arguably the principal method of achieving this objective. Sector stakeholder organizations typically have few qualified or experienced personnel to manage their WASH sector interventions. Lack of staff, skills, equipment, tools, and experience make it difficult for employees to fulfil their responsibilities and the increased challenges ahead under the NRWSSP. Lack of capacity is recognised as a key constraint to sector development.

The Human Resources Development (HRD) strategy is based on the following principles:

- Support at all levels: capacity building will be provided at all levels (national, provincial, and municipal) through Programme TA teams located within key sector institutions that will be responsible for the provision of training, technical assistance, coaching and mentoring of relevant rural water and sanitation personnel, and standardisation of processes, supporting the implementation of the NRWSSP;
- Learning through pilots: the NRWSSP will be implemented using a phased approach with implementation beginning on a pilot basis in three provinces. Support will be provided by technical assistance teams at the central and provincial levels during Phase 1, with lessons learnt integrated into the roll-out of the programme in subsequent phases;
- Maximising in-country capacity: existing and future local training institutions will be a focus of capacity building activities, and a training of trainers approach followed, to maximise the transfer of knowledge and tools in a sustainable manner;
- Attaining sufficient capacity to achieve decentralisation goals: service delivery should be conducted at the lowest appropriate level, therefore capacity building will focus on lower

levels with an emphasis on municipalities as the managers of rural water and sanitation service delivery;

- Prioritising short-duration training opportunities: given the low number of subsector staff and their limited qualifications, short-duration courses and training activities are preferred so as to quickly upgrade staff skills in as short a period as possible while allowing them to learn by doing with the periodic support of provincially-based TA;
- Institutionalising and retention of capacity: building capacity involves not only the training of individuals, but the development of tools and processes and provision of equipment to allow capacity to be institutionalised and retained within sector organizations;
- Building on lessons learnt: lessons learnt in Angola and other countries will be integrated into the development of human resources, where applicable, through the introduction of new methodologies (e.g. experiences from Mozambique in the demand responsive approach and in participatory community mobilisation and training and hygiene education by zones, establishing partnership programmes between more established rural service providers for coaching purposes, and the creation of an umbrella organization for rural water users and providers at the national level, etc.), study tours and training in other countries;
- Learning by doing: emphasis will be placed on “hands on” training, including mentoring and on-the-job training.

A full description of the application of these principles can be found in the Operations Manual.

### 3.2.4 Planning and implementation

At the outset of the NRWSSP, an in-depth capacity assessment of public and private stakeholders in NRWSSP provinces and municipalities will be conducted. This will build on the initial assessments being conducted under this consultancy and by the DNA-TA. Based upon these findings, a detailed capacity building and HRD Plan will be developed. Capacity building will span four areas: (i) institutional roles and responsibilities; (ii) personnel training/skills development; (iii) provision of facilities and equipment to improve efficiency; and (iv) development of tools (systems, procedures, guidelines & manuals) to improve institutional and professional effectiveness. Existing training resources will be used and strengthened as appropriate to supplement capacity building efforts, particularly the Local Administration Training Institute (IFAL), technical schools, and universities.

Training will encompass the provision of customised courses based on a training needs assessment, followed up with coaching and mentoring to ensure application of the acquired skills and knowledge. Short courses and workshops will be arranged on key topics identified as essential to improved functional performance of institutions, again followed up with coaching and/or on-the-job training (OJT). Training will also be provided via study tours and various customised pilots of new approaches being introduced.

Facilities, equipment and office needs will be met, as required and agreed upon, to address primarily transportation and communications needs which are currently severely constrained; provision of office equipment and technical equipment related to work functions is also recommended.

Tools will include information collection and management systems. Record-keeping and financial management systems will be analysed to improve reporting accuracy and timeliness. Various manuals and guidelines on processes and procedures will be prepared, such as in procurement, construction supervision, Quality Assurance and Quality Control (QA/QC), operation and maintenance, etc., depending on the needs identified.

Note that in Table 3.8 the training content and methodologies are not specified. Additional details are provided in the DNA-TA training proposals, and in the documentation related to the Onga Zanga training centre. The Operations Manual provides some additional details, however, the actual training curriculum and methodologies will be developed in agreement with the findings of the training needs assessments performed in the first months of the Programme.

Note as well that a single training topic might represent several different training activities and be directed towards diverse audiences. For example, training in monitoring and reporting is expected to be significantly different for DNA than the municipal governments and the GAS groups. Some stakeholders may require or request training in GIS and mapping techniques, whereas others may only require cursory knowledge on the matter. Curricula for key topics such as the NRWSSP, DRA, and MoGeCA, should be developed immediately, irrespective of the assessment results.

In light of the fact that the municipalities will require abundant training, negotiations with IFAL should be opened immediately to prepare basic courses for local government personnel. It is expected, nonetheless, that early training efforts will fall to the province-based technical assistance teams. Ideally, the TA teams supported by existing DPEA staff and consultants, could prepare and deliver the initial training packages, while simultaneously working alongside IFAL or a local university to institutionalise the training for Programme roll-out. The Operations Manual provides a useful task breakdown and proposed timeline for the capacity building component for Phase 1.

Municipalities and their *comunas* are grouped together for training purposes, however, municipal governments will each decide for themselves which individuals to recommend for which training. Similarly, private firms and individual entrepreneurs are grouped together, however, training content will not always be simultaneously appropriate for both groups.

While it is critically important that people learn new skills, become introduced to new processes and methodologies, and gain a better understanding of all the components of rural WASH programming, the NRWSSP will pursue a learning by doing philosophy as a way of ensuring that project execution and will start as soon as possible. Training and implementation will, therefore, proceed side-by-side.

### 3.2.5 Role of technical assistance

The NRWSSP's national and provincial technical assistance teams assume strategic significance in the success or failure of the Programme. It must be clear to all partners that the objective is not to merely extend "access" to the unserved and underserved by installing infrastructure, but to create the conditions in every locality and municipality such that services are reliable, inclusive, and sustainable – financially, socially, technically, environmentally, and managerially.

The TA teams' role is primarily to inculcate this concept and assist in providing the skills and tools needed institutionally and professionally to make this objective a reality. TA personnel are expected to be not only technically strong, but capable of shaping a vision, skilled in most aspects of rural water supply, sanitation, and hygiene promotion, as well as in capacity building and communications.

**Table 3.8: Expected training and capacity building needs of NRWSSP primary stakeholders, by general topic.**

| | NATIONAL | | | | PROVINCIAL | | MUNICIPAL | | | PRIVATE SECTOR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOPIC | MINEA | DNA | PMU | Other National | DPEA | Other Prov. | Municipality / Comunas | BMEA/ EMEA | GAS / Communities | Firms and Entrepreneurs | NGOs | Other Civil Society |
| The NRWSSP | ◊ | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| Sector policy | | | ◊ | ◊ | | ◊ | ◊ | ◊ | | | ◊ | ◊ |
| Norms and standards | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | | ◊ | ◊ | |
| Sector planning | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | | | | | ◊ |
| Sector finance | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | | | |
| | | | | | | | | | | | | |
| DRA | ◊ | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| MoGeCA | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| Water supply | | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | |
| Hygiene and sanitation | | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| Sustainability | ◊ | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| Operation, maintenance, and management | | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| | | | | | | | | | | | | |
| Procurement | | ◊ | ◊ | | ◊ | | ◊ | | | ◊ | ◊ | |
| Contract Management | | ◊ | ◊ | | ◊ | | ◊ | | | | | |
| Monitoring and reporting | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | | ◊ | ◊ |
| Construction techniques | | | | | | | ◊ | ◊ | | ◊ | ◊ | |
| Pumping alternatives | | | | | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | |
| | | | | | | | | | | | | |
| Community mobilisation | | | | | ◊ | ◊ | ◊ | ◊ | | ◊ | ◊ | |
| Equity, gender, environment | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ | ◊ |
| Post-construction support | | ◊ | | | ◊ | | ◊ | ◊ | ◊ | ◊ | ◊ | |

In addition to the technical expertise for WASH infrastructure and project implementation at the community level, the PMU and TA teams include key specialists in procurement, capacity building, communications, and monitoring and reporting. The entire TA group is expected to spend the majority of their time in the Provinces and Municipalities working with Programme implementers. The TA team must be careful to avoid assuming implementation roles of local staff, and local staff need to avoid over-reliance of the TA group. Where unique knowledge or skill sets are required, the Programme will contract qualified consultants on a short-term basis.

# 4 RECOMMENDED TECHNOLOGIES, SERVICE LEVELS AND SUPPLY CHAIN STRATEGY

## 4.1 Water supply

### 4.1.1 Background

The “Water for All” Programme (PAT) is the primary state-managed funding instrument in Angola for rural and peri-urban drinking water. Established in 2007 and currently on-going, the programme has constructed both water points and piped systems. The technologies used within PAT include boreholes equipped with hand pumps, solar-powered pumping systems with piped distribution, electro-mechanical pumping systems with piped distribution (both with and without treatment systems), spring-fed gravity piped systems, as well as a few hydraulic pumping systems and surface water systems with packaged treatment plants. The water sources used include groundwater, springs and surface water. The data within SISAS confirms that these are the main types of systems used in rural Angola.

Boreholes with hand pumps will likely remain a widely used technology to serve the needs of the rural population in Angola, while solar-powered systems are becoming a more popular option both among communities and government. Based on the technologies in use in Angola and the expected conditions in rural communities across the country, six technology / water source options have been selected as those anticipated to be most widely used under the NRWSSP. These technologies represent a combination of water sources and technology options that are cost-effective in terms of capital and O&M costs, are simple to operate and maintain, and provide the highest quality of water possible to communities. The exception to this is the use of surface water with an associated treatment plant, which is expensive and more complex to operate. It is included in the recommended technologies for communities meeting specific criteria and where no other alternative exists for potable water supply. Unit costs for infrastructure construction and O&M have been calculated for these options and used to develop the investment plan.

Angola does not have design standards or standard drawings for the rural water sector. These will be prepared by the NRWSSP. Prior to their approval, accepted international standards, such as those published by RWSN, will be used in the design of the infrastructure. Training courses will also be prepared on select themes such as solar solutions, borehole design, pump sizing, etc. to build technical capacity for rural water design and construction.

### 4.1.2 Water sources

**Groundwater sources**

*Drilled boreholes*

Groundwater resources, which are generally of better quality than surface water sources, can be tapped by drilling a borehole into the aquifer with a drilling rig operated by a trained crew. Groundwater is readily available across most of Angola. According to the SISAS database, within the NRWSSP *comunas* (across all provinces) 74% of systems in rural areas use groundwater as the source. Depending on the lithology and characteristics of the geological formations, various borehole designs can be used, the definition of which is based on the dominant porosity type, the extent of the aquifer formations and the productivity of the formations. The design also depends on the volume of water to be extracted, and the type of extraction device to be used (both now, and in the future). It is expected that boreholes constructed within the NRWSSP will be limited to boreholes with screens, irrespective of the

formation in which they are drilled, i.e. boreholes fitted with a casing extended to the depth of the borehole and a screen protected by a gravel pack consisting of a material with an effective size greater than that of the aquifer formation.

The geology of the country may be broadly divided into (a) sedimentary terrains (generally soft) and (b) crystalline formations (generally hard). The drilling technique used at a particular site will depend on the geology and will be either rotary drilling with a drill bit only, or the use of the drill bit supplemented by the use of the down-the-hole hammer. Borehole depths will vary from province to province, and within each province, according to the geology, ranging from 20m in Huambo Province to as deep as 200m in Cunene Province.

The maximum depth of a borehole is dependent on the pumping method to be used, the aquifer transmissivity, sustainable yield and demand curve (see Section 4.1.23). Casing and screening is used in all boreholes, along with a sand trap below the screen and a bottom cap to seal the base of the casing. Annular backfilling is used to provide a foundation for a sanitary seal and support for the sidewalls/casing. After successful completion of the borehole construction, a concrete collar and sanitary seal is installed to prevent contaminated surface water from entering into the borehole.

Drilled boreholes are appropriate where groundwater is available at reasonable depths, or where the groundwater is very deep but no other source is available. Drilling is likely the only option for accessing groundwater deeper than approximately 20m. It is the most expensive method to reach a groundwater source, however it is quick and efficient, and results in a borehole that can be equipped with various pumping devices. Drilling rigs may have difficulty accessing some communities, particularly in the rainy season, however small drilling rigs do exist which can mitigate this risk. Drilled boreholes are the recommended option for tapping a groundwater source in the NRWSSP.

*Alternatives to drilled boreholes*

In some cases it may be possible to reach a groundwater source using alternate methods to drilling a borehole, particularly in unconsolidated formations (i.e. granular material). These methods are appropriate where the water is within 20m of the surface and are described here for information purposes but are not likely to be widely used under the NRWSSP.

Hand-dug wells are limited to areas where manual digging is relatively easy and safe. Situations where rocks and boulders make digging very cumbersome or where the ground is very loose can lead to collapsing of the wells, and drilling boreholes should be considered. A dug well normally taps overburden water. Therefore, the siting and location of the wells is important. Dug wells require lining to prevent collapse and exclude some potential contaminants. Lining materials that can be used include reinforced concrete rings, bricks, and cement blocks. Dug wells are inexpensive to construct and involve the community to a greater extent in construction than a drilled borehole. However, this technology provides only basic service; the wells may easily be polluted, and during periods of drought or prolonged dry spells, water tables can fall dramatically leaving hand-dug wells dry. Open hand-dug wells should be covered and preferably installed with a reliable hand pump.

Similar to the hand-dug wells, hand-drilled boreholes represent a low-cost option for the provision of safe water. Typical investment costs will be similar to the hand-dug wells. Hand-drilled boreholes can be constructed using a variety of techniques depending on the geology of the area, including hand augering, wash-boring (jetting), percussion drilling, and sludging. The wells are fitted with ID 100 mm well casings and screens. The well yield should be sufficient for a hand pump, about 0.5 to 1 $m^3$/h. Shallow conditions of not more than 15 metres allow installation of direct action hand pumps, which are easy to maintain. Hand-drilled boreholes are not suitable outside their hydrogeological limitations, where the

formation is too hard or the water bearing formation too deep. Hand-drilling involves the community in construction, however can be slow.

**Spring sources**

Springs occur where groundwater naturally flows out of the ground and are most likely in hilly/ mountainous areas. Once capped and protected springs offer a source of water of good quality that is easily tapped. To use a spring for a source of potable water, a spring catchment is required to protect the water from contamination. Before a spring is protected it is necessary to determine the minimum flow rate to ensure it will provide sufficient water to meet demand throughout the year. The spring catchment is constructed by first excavating the spring, building the catchment, backfilling the filter package, installing a supply pipe, building a spring box / chamber, refilling the earth cover and finishing the protection zone with a fenced perimeter of protection around the spring catchment to ensure animals and unauthorised individuals don't easily have access to the installations.

Springs are present in various regions across Angola. They are best suited as a source of water where the spring is located relatively close to the community and at an elevation that allows for either gravity flow down to the community or a ram pump system (see Section 4.1.3) to pump the water up to a storage reservoir. Springs can be a very cost-effective source of water, depending on the distance from the community as the cost of long pipelines will increase the investment cost required. No special equipment (e.g. drilling rigs) is required and the community can provide labour in the construction process.

**Surface water sources**

Surface water sources, such as lakes, rivers and streams, provide alternatives for water supplies, however surface water is likely to be of poor quality as it is exposed to microbiological and chemical contaminants from many sources. Therefore, there is a need to treat surface water sources before consumption, adding to the cost and complexity of a surface water system. It can also be affected by wide seasonal variations in turbidity and flow, making design of intake structures and treatment systems a challenge. Within the NRWSSP, surface water is unlikely to be widely used but could be considered where no alternative with higher water quality exists. Data within SISAS indicates that within the NRWSSP *comunas* (across all provinces) 27% of systems use surface water as the source. It is expected that this percentage will be much lower within the programme as the focus will be on identifying groundwater or spring sources of good quality, with surface water being used only where no other source exists.

**Rainwater harvesting**

Proper utilisation of rainwater that often falls in big storms can be achieved by developing and encouraging suitable ways of interception and storage. Rainwater harvesting is a way of collecting rainwater from surfaces that do not allow water to soak or seep into the soil. This option is presented for information, but is unlikely to be widely used in the NRWSSP. Rainwater systems are generally a household-level solution and become very costly for community water supply. However, in some locations without any other water sources of good quality available, rainwater catchment may be the only option available.

Rooftop catchment systems gather rainwater caught on the roof of a structure using gutters and downspouts typically made of PVC and draining to one or more storage containers ranging from simple pots or jars to large ferro-cement tanks. Collection systems may be fitted with a first-flush device for diverting the initial run off water from a rainstorm, which may be contaminated with dust, leaves, insects, and bird droppings that collect on rooftops.

Rainwater harvesting can be a feasible alternative for water supply for many water stressed communities, especially communities in:

- Semi-arid areas where surface water sources do not exist and development of ground water sources involves excessively high costs;
- coastal communities where ground water sources are of poor quality (seepage of seawater into wells and boreholes);
- island communities; and
- community centres, hospitals and schools.

### 4.1.3 Water extraction methods

**Gravity flow**

The availability of a water source (usually a spring or surface water source) above the elevation of the point of use makes the construction of a gravity flow system possible. The advantage of gravity schemes is that they do not require an energy source as no pumping is required. Therefore, the implications for operation and maintenance are lower and the cost of energy for pumping can be avoided. However, such systems often require covering long distances between the source and the point of use by a transmission main. Therefore, the relatively low cost of operation and maintenance is offset by the high investment cost for pipelines and tanks.

There are two types of gravity-flow systems, each type being determined by the specific design characteristics. These are open systems and closed systems:

- An open system is based on the concept that the taps can be open all day long and water is flowing uninterrupted all the time. The yield of the water source has to be sufficient to provide a constant and steady flow to all outlets (tap stands). Open systems do not require a reservoir; and
- Closed systems are needed when the safe yield is not sufficient to provide a continuous flow at all taps. In such cases, it is necessary to store water in a tank for peak consumption periods.

Both types require spring or upstream protection works, and they may require break-pressure tanks and control valves.

A topographic survey has to be conducted along the proposed pipeline route to determine the elevations along the route, and the optimal pipe routing and sizing. Surveys should note the ground condition, keeping in mind the need to dig trenches in which to lay the pipe, or the need for safely negotiating obstacles such as streams, cliffs and other challenging features.

**Pumping devices**

Groundwater sources, and in most cases also surface water sources, need to be pumped to the point where the water can be collected or stored. The following section describes the main pumping devices available.

*Hand pumps*

Boreholes equipped with a hand pump can provide a safe point source for about 250 people. Currently in the NRWSSP *comunas* (across all provinces) 36% of rural water systems consist of boreholes equipped with hand pumps. The pumping output of a hand pump will vary depending on the model and the depth to the water table. Typically, the discharge rate is between 0.5 – 1.0 $m^3$/h (discharge decreases as depth to the water table increases), therefore lower yielding boreholes can be used. The depth from which hand pumps are able to pump water will vary depending on the particular pump, however, hand pumps are widely available for depths to 45m, with deep well hand pumps available for depths of 85m or more.

Many hand pumps are VLOM pumps, meaning they can be operated and sustained using Village Level Operation and Maintenance, provided the necessary spare parts are available. Hand pumps are best suited to small communities or communities that are very disperse. They are the most cost effective pumping option but do not supply the quantity of water possible with an electromechanical pump (assuming the borehole yield is adequate).

Selection of the hand pump should take into account the following borehole characteristics:

- yield;
- static and dynamic water levels based on the results of borehole pumping tests;
- estimated number of users;
- casing diameter; and
- certain water quality parameters.

The GoA has approved a policy for standardised hand pumps for use in rural areas[5]. These are the Afridev, the Volanta and the Vergnet Hydro. Standardising hand pump technology in the country is designed to minimize fragmentation of supply and improve the viability of local suppliers, limit the variety of spare parts that needs to be available in the market (improving their supply and decreasing costs), and reduce training needs and improve the community's ability to perform O&M due to their familiarity with the technology. The three standard hand pumps are described in Table 4.1: Characteristics of Angola's Standard Hand Pumps

**Table 4.1: Characteristics of Angola's Standard Hand Pumps [6]**

| ASPECT | AFRIDEV | VOLANTA | VERGNET HYDRO |
|---|---|---|---|
| Type | • Conventional, lever action hand pump | • Reciprocating pump driven by large flywheel | • Foot pedal operated pump |
| Uses | • Shallow / medium depth boreholes | • Medium to very deep boreholes | • Medium to deep boreholes |
| Maximum Lift | • 45m | • 80m | • 60m |
| VLOM | • Yes | • Yes | • Yes |
| Discharge | • 0.5 – 1.4 $m^3$/h | • 0.2 – 1.0 $m^3$/h | • 0.7 – 1.6 $m^3$/h |
| Private / Public Domain | • Public | • Private | • Private |
| Applications | • Medium depth water tables (10-45m) (e.g. Central & Northern Angola) | • Extra-deep water tables (30-80m) (e.g. Southern Angola) | • For schools (feeding water to an overhead tank) |
| In-Country Representation | • Spare parts supplier in Huambo (Habitec) | • Representatives in Lubango (INTERCAL) | • Representatives in Luanda (PRECISAL) |
| Advantages | • Installation does not need lifting equipment;<br>• Reliable and easy for community to repair;<br>• Can be manufactured locally. | • Easy for community to repair and maintain. | • Installation does not need lifting equipment;<br>• Easy to repair above-ground components. |
| Disadvantages | • Only good to 45m | • Difficult to install;<br>• Requires extensive | • Below-ground components difficult to repair |

[5] DNA (2009). *Política Nacional de Bombas Manuais em Angola*. Prepared by UNICEF, Development Workshop, and the European Union. Approved by the GoA as part of MoGeCA.

[6] RWSN (2014). *Hand Pump Technology: Public Domain Handpumps; Proprietary Handpumps*. Accessed at: http://www.rural-water-supply.net/en/implementation on June 3, 2014.

**Table 4.1: Characteristics of Angola's Standard Hand Pumps [6]**

| ASPECT | AFRIDEV | VOLANTA | VERGNET HYDRO |
|---|---|---|---|
| | | masonry work;<br>• Some users find it difficult to start the pump;<br>• Dangerous for children. | • Diaphragm requires frequent cleaning and replacement is expensive;<br>• Requires considerable effort to operate. |

The hand pump standardisation policy should be refined by evaluating and recommending the approval of a fourth hand pump model, a direct-action suction pump for use where groundwater is readily and reliably available at a depth of less than 8 metres. The three currently recommended hand pumps are all medium to deep-well hand pumps and are not efficient for shallow groundwater extraction.

The manufacturing of high quality hand pumps is essential to their sustainability. Many hand pumps fail due to poor materials and inferior quality of pump components. Therefore, to ensure that hand pumps are manufactured to high quality standards, the technical specifications should refer to the Rural Water Supply Network's (RWSN) hand pump standards where these are available (e.g. for the Afridev hand pump). The contractor will check that the pumps supplied meet those standards or those of the manufacturer in the case of proprietary hand pumps, however ultimate responsibility for quality control rests with the government or financing party.

Concrete aprons and drainage structures will be designed according to accepted standards, such as the latest revision of the RWSN[7] design standards for the installation of the Afridev hand pump, in the absence of national standard designs in Angola. The aprons should be constructed such that infiltration into the borehole cannot occur. Excess water must drain away without causing secondary problems at the surroundings of the apron, i.e. insects, pollution, etc. The apron will be sloped towards the drainage channel, which leads to the soak away pit.

*Electric submersible pump*

If there is a reliable power supply from the grid to the community, an electric submersible pump can be considered. With this option, the water would be pumped from the source (likely a borehole) to an elevated reservoir and then would flow through a distribution system to the community. In most cases, the cost per capita will decrease as the number of beneficiaries increases. However, the borehole yield has to be sufficient to serve the larger user group. In large communities it may be feasible to use more than one borehole as the water source. In smaller communities electric submersible pumps would be appropriate if they fall within a reasonable capital unit cost range.

Electric submersible pumps provide a high service level and can provide a relatively high quantity of water per capita, however electromechanical pumping systems are significantly more expensive than a simple hand pump to construct and are more complex to operate and maintain.

Electric submersible pumps are selected based on the required flow and pumping head. These can be determined after the borehole is drilled and the flow rate and depth to the water table can be evaluated. The sustainable yield of the borehole (rate of water extraction

[7] RWSN (2007). *Installation and Maintenance Manual for the Afridev Handpump.* Revision 2-2007. Switzerland: SKAT-RWSN.

which allows the aquifer to properly recharge, to minimize the risk of aquifer overdrafting or even depletion) should not be exceeded. This is unlikely to occur with a hand pump, but could occur with an electromechanical pump. This is determined using a series of pumping tests. A percentage of the total sustainable yield is then used to determine the maximum pumping capacity for the borehole.

Long distances from grid to the pump site require high investment in the power line. Under such unfavourable conditions, it may be better to choose a solar pump system. Diesel-powered pumps are not being recommended due to sustainability issues (e.g. fuel availability) and higher O&M costs, although they may be appropriate under certain conditions such as where fuel is readily available and the community is willing to pay the higher O&M costs.

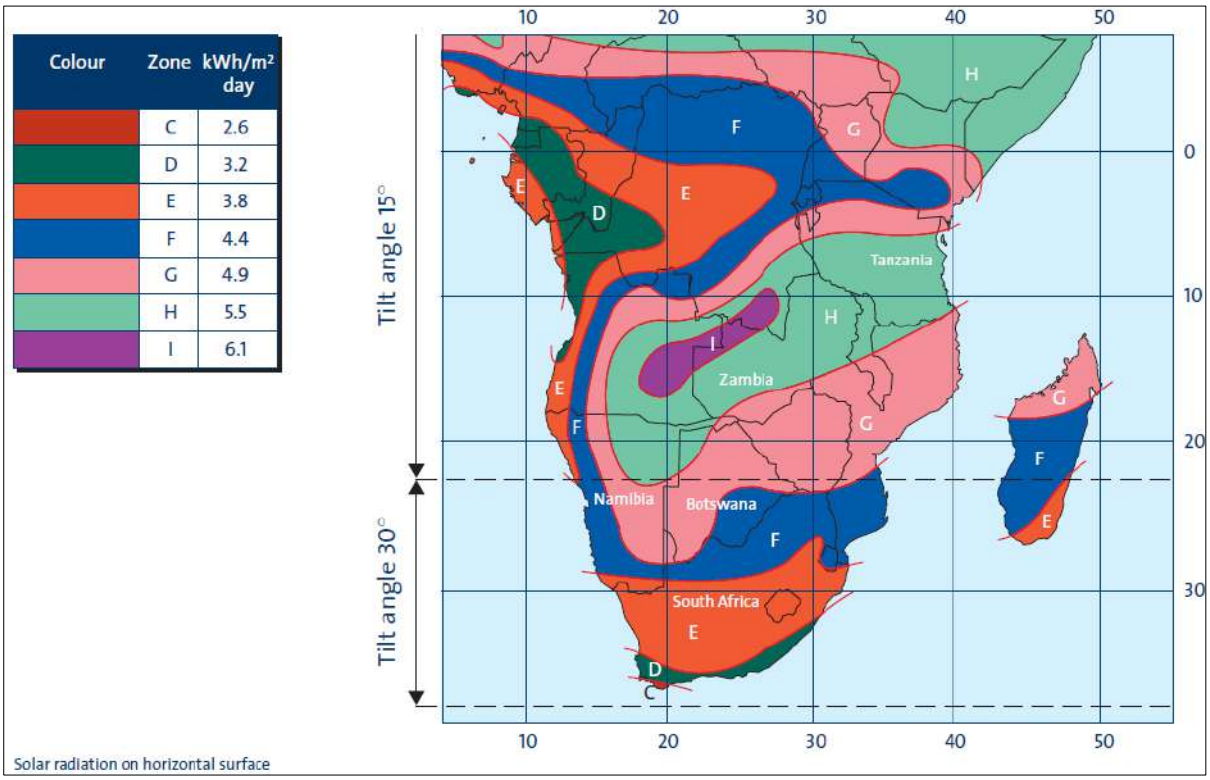
*Solar powered submersible pumps*

If the solar radiation is sufficient, solar pumps have a high potential for providing water in larger communities where electricity is not available. Angola has gained experience with solar powered pumping systems through their introduction in the PAT. In 2012 the systems installed under PAT showed a very high functioning rate of 96% (68 of 71). Based on the PAT experience, it can be concluded that these systems are suitable to the Angolan context.

Solar pumping systems consist of a submersible pump equipped with a controller, powered by energy produced by a set of solar panels. Similarly to a pump powered by the electrical grid, solar systems would usually involve water from a borehole being pumped to an elevated reservoir and from there through a distribution system to the community.

The availability of a good solar resource has a strong influence on the cost-effectiveness of a solar power system. Levels of solar insolation in Angola are adequate for solar powered drinking water systems. According to the solar radiation map Figure 4.1 which indicates the irradiation figures in Southern Africa, the average solar radiation (in July, when the radiation should be at its lowest) ranges from 3.2 to 6.1 kWh/m$^2$/day. In regions with higher solar radiation, the number of panels required to power the pump will be less, decreasing the overall capital cost.

**Figure 4.1: Solar Insolation Map of Southern Africa for July[8]**




The selection of the pumps to be installed will be based on the technical data of each borehole, namely: diameter, yield, static water level, dynamic water level and height of the tower and tank (i.e. pumping head).

Solar panels are very reliable and many manufacturers sell the panels with a guarantee of 25 years. The cost of the panels has been decreasing in recent years, making solar systems a more viable option. The output of a solar module varies with the amount of light available. Solar panels are very sensitive to shading and as a result must be located where this will not be an issue. The number of panels required to feed the system depends on the power rating of the panels and the power requirement of the pump selected for each system. It is recommended that the panels and pump be sourced from a supplier who sells combined panel and pump systems.

The investment cost for solar systems is relatively high. The cost for O&M is however favourable as no fuel or electricity supply cost is needed. The photovoltaic systems run for many months with minimal O&M requirements. Care is needed to protect the systems properly. Solar panels can be used for many other purposes and are therefore often stolen. Some possible methods for securing the panels are to construct them on an elevated platform, and to include a locked gate on the fenced enclosure.

*Hydraulic ram pumps*

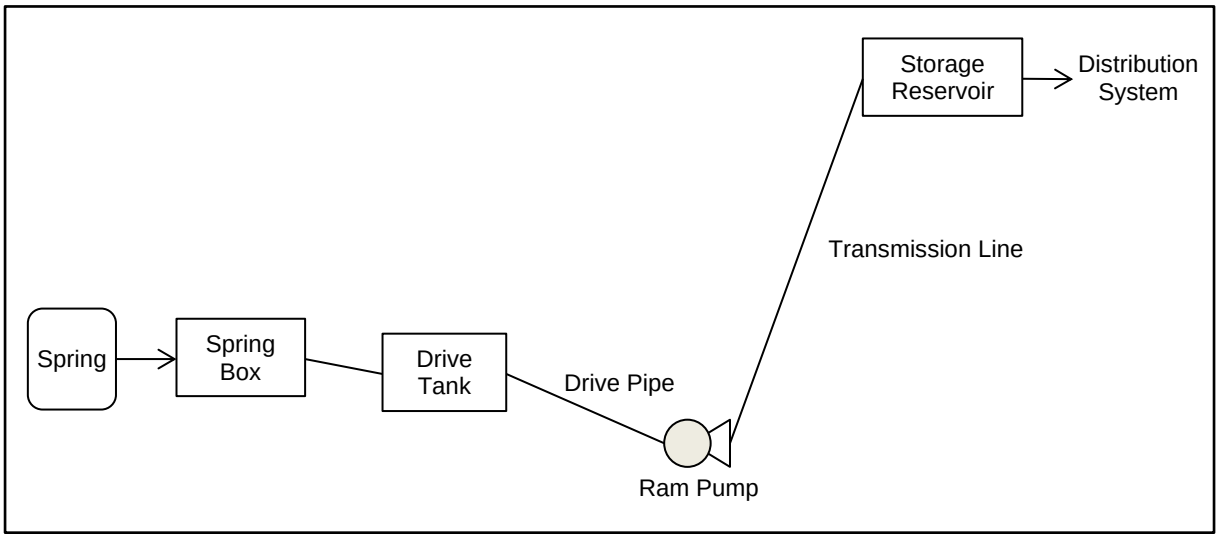
The hydraulic ram pump uses the water hammer effect to “use the energy of a large amount of water falling from a small height to lift a small amount of this water to a much greater

[8] Grundfos (2011). *Solar Insolation Map of Southern Africa – July*. From WinCAPS design software, accessed September 2011.

height"[9]. The efficiency of the ram pump ranges from 50% to 80%, depending on the quality of the material, the design and the age of the components. The ram pump is installed on a pump basement to hold the pump against the shock of the water hammer effect and to collect or redirect the waste water to avoid stagnation. A cage can be installed on top of the concrete basement to protect the pump.

A ram pump is generally used with a spring catchment system. The water will flow from the spring box to the drive tank. The drive tank's objectives are to prevent solid elements and air from entering the ram pump, to allow continuous flow in the ram pump, to allow the water to enter with a high velocity into the ram pump, and to allow self-maintenance of the system. Maintenance of the drive tank will be done through a manhole located on the top. From the drive tank a drive pipe allows the water to enter the pump body with high velocity. It should be able to resist the shock of the water hammer effect, which means that quality galvanized iron pipes should be used. From the pump a transmission line brings the water to the reservoir. The ram pump system schematic is shown in Figure 4.2. Design of the pump will depend on the difference in height between the source of water and the pump, the lift required, the flow available and quantity of water required.

**Figure 4.2: Overview of a ram pump system**




Specific elevation and terrain conditions are required for this option to be appropriate. A ram pump installation is useful in cases where the spring source is located at or below the elevation of the community. The longer the piping lines, the more expensive the system will become. It would be more expensive than a gravity-fed spring catchment system but less than a solar or electrically-powered system. O&M costs would be minimal as there is no need for an external source of power and few moving parts to wear out.

*Centrifugal pumps*

Centrifugal pumps are the most common type of pump used to extract water from a surface water source and pump it to storage and treatment facilities on higher ground. These are able to draw water from up to 7m below the pump, although pump performance will become inefficient at height differences greater than 3m. Where the pump can be securely positioned within this height range the pump can be mounted on the ground, with the suction pipe connected to the inlet. Submersible centrifugal pumps (positioned in the water) are available

[9] Jeffery, T.D. et al. (2005). *Hydraulic Ram Pumps: A guide to ram pump water supply systems*. Warwick University - The Department Technology Unit. MDG Publishing, Warwickshire, UK.

and can be used where the height difference between the water surface and the inlet is greater than 0.7m. The pumps require a reliable power supply from the electrical grid. Centrifugal pumps are selected based on the required flow and pumping head.

The community population would need to be high and the community relatively dense for the investment cost per capita to be reasonable. For larger communities the cost per capita will sharply decrease. Centrifugal pumps provide a high service level and can provide a relatively high quantity of water per capita, however are expensive and are more complex to operate and maintain.

### 4.1.4 Water storage, treatment and distribution

The above water extraction methods, with the exception of hand pumps, require a small piped distribution system. In some cases the network could be a transmission line to one tap stand, however in most cases the distribution system will involve a reservoir and a small piped network to several tap stands located in the community. The costs vary according to the lifting devices used and depend on the level of service provided. The length of the distribution network, the size of the reservoir and the number of tap stands all influence the investment cost.

**Storage reservoir**

Water from the source is either pumped to an elevated storage reservoir (at a high point in the community or on a tower) or flows by gravity to a reservoir at a lower elevation than the source. The position of the reservoir will affect the design of the pipework. Its elevation should be such that sufficient water pressure is maintained at the far ends of the distribution system. The reservoir should be sized to allow sufficient storage to enable peak demand to be met and be based on the yield of the source, pump size and hours of operation. The storage reservoir for a solar system would be larger than for an electricity-powered pump for the same source due to the limited amount of time sunlight is available to power the pump. Therefore more water needs to be stored to meet peak demands. Ground-level reservoirs are more cost effective than those requiring a tank stand to elevate the tank.

**Piped distribution system**

Small-piped distribution systems are required for either gravity-flow systems or motorised pumping systems. In rural areas, the distribution networks are normally arborescent (i.e. branching) networks. Reticulated systems including loops include fail-safe features (i.e. repairs on branches can be made without closing the whole system). It is left to the designer to determine whether the additional cost is warranted.

Long distances from the pump site to the village or a low population density can raise the costs considerably. Under such adverse conditions, several point sources with hand pumps could be more economical even for the larger communities.

The sizing of the pipes and design of the pipe network can be done using Epanet, or other similar software. The layout of pipes and demand nodes (tap stands) needs to be determined, followed by calculating the peak flow rate in each pipe and then checking headlosses throughout the system, ensuring minimum and maximum heads are not exceeded. Pipe materials can include galvanized iron or HDPE, for example. The network will need to include additional appurtenances such as valves and break pressure tanks where necessary and may include water meters if appropriate.

**Tap stands**

Community members will collect water at the tap stands located throughout the community. Communal tap stands serve the most people possible in a cost-effective manner. The

number of tap stands will depend on the population to be served and the layout of the community, making sure to minimise walking distance to the taps and meeting accepted standards in this regard. The community should be fully involved in the decisions made about the siting of tap stands so that social, cultural and gender considerations are taken into account. Technical constraints will also need to be considered including the water pressure requirements at the tap stand and the disposal of water though a soakaway or other system. The design of the tap stand itself will be according to accepted standards. House connections are unlikely to be widely used within the NRWSSP but would be feasible where sufficient quantity of water is available and where costs can be met.

**Other related infrastructure**

Other related infrastructure can be considered at the site of a water point and / or tap stand, depending on the needs of the community including washing basins and animal watering troughs. These add to the cost of the system, however are useful in promoting hygiene and minimising the risk of contamination of the water point.

**Treatment**

Groundwater and springs supply water of good quality, which should be confirmed for each source through water quality analysis, and do not require treatment beyond simple chlorination if desired. Surface water is not recommended as a widely used source within the NRWSSP due to the need for complex treatment of the water prior to its consumption. Treatment systems add significantly to the investment cost and also increase the complexity and cost of O&M. As a result, sustainability is often compromised. Treatment systems could be considered under certain unique circumstances, such as where there is no source of water of good quality or where there are specific contaminants that need to be removed from a source prior to consumption (e.g. iron, fluoride).

Packaged treatment plants are systems that are designed and manufactured off-site and delivered as a unit to the community, and are an option for sources requiring treatment. They are available from a variety of manufacturers and have been used in Angola under the PAT, although many are not functioning (fewer than 50% are operational). The plants reduce the complexity of construction, thereby decreasing capital and installation costs compared with a non-packaged system. Although designed to operate with minimal effort, the systems require a trained operator; chemicals and other supplies which are not widely available in rural areas; and a reliable source of electricity. Systems requiring chemical reagents or careful maintenance regimes have been shown to fail after short periods in operation and are unlikely to offer a sustainable option in most rural areas. Due to these reasons, these systems are not recommended except in circumstances where no alternative to treated surface water is available.

Adequate household water storage should be a part of any community mobilisation and training activities, to ensure the water collected at the source remains potable once stored in the house.

### 4.1.5 Recommended technologies for the NRWSSP

Technology selection for each community will be dependent on the water source available, design population and density, demand to be met, O&M considerations and community preference, among other technical criteria. The following are the six technologies recommended for the NRWSSP, which have been used in the costing of the investment plan:

- **Boreholes and hand pumps:** consisting of a drilled borehole equipped with a hand pump, and associated civil works including an apron and drainage channel with a soak-away pit.

- **Gravity-fed piped distribution**: consisting of a protected spring catchment and a spring box, from which a transmission line allows water to flow by gravity to a reservoir; water is then distributed through a small piped network to tap stands strategically located within the community; break-pressure tanks or valves can also be used if differences in elevation in the system are too high.
- **Ram pump with piped distribution:** consisting of a source (protected spring or small stream) which feeds a hydraulic ram pump that pumps the water to a reservoir; the system components are the 1) spring box; 2) drive tank and associated drive pipe; 3) ram pump and pump basement; 4) transmission line; 5) reservoir; and 6) distribution and standpipes.
- **Solar pump with piped distribution:** consisting of a borehole and submersible pump powered by solar panels; water is pumped to a reservoir then distributed by gravity to public tap stands in the community.
- **Electromechanical pump with piped distribution:** consisting of a borehole and submersible pump powered by the electrical grid; water is pumped to a reservoir then distributed by gravity to public tap stands in the community.
- **Surface water with pump, treatment and piped distribution:** consisting of a surface water source (stream, river, lake or reservoir) pumped by a centrifugal pump to a treatment plant and then to a storage reservoir, from where it is distributed by gravity to public tap stands in the community. This option is not recommended to be widely used and is only appropriate where no alternatives exist.

Each of the above technologies has variations and can be customised to each particular community's technical and social constraints and criteria. For example, spring catchments can be designed with no piped network, as a standalone protected water point, while solar systems can consist of a borehole, solar panels, a small storage tank and a single tap stand with no piped network to other parts of the community. Where appropriate, systems can also be designed for future upgrades. The above technologies have been used for planning purposes and to develop the NRWSSP investment plan. In practice, the design of each system will respond to the local context. As such, other technologies not listed among the six recommended options may be used under very unique or challenging circumstances or for multi-village systems, such as rainwater harvesting and diesel pumping.

### 4.1.6 Service levels and constraints

The NRWSSP will be implemented following the demand-responsive approach (DRA). This approach requires the participation of the users in all aspects of service delivery and provision, enabling communities to assume an active role in requesting and selecting service levels based upon informed choice. The six technological options, and others if necessary, will be evaluated for use in each community based on a series of parameters including annual per capita costs (capital and operational), ability and willingness of users to pay these costs, expected lifespan of critical components, degree of user satisfaction, as well as technical constraints and criteria. This type of analysis would be performed with each participating community as part of the informed demand that characterises DRA. In this way, it is the community who selects their service level and management model in accordance with the implications surrounding their preferences in terms of the associated long-term financial and social costs and obligations.

The advantages and disadvantages of each of the recommended technologies are described in Table 4.2.

**Table 4.2: Advantages and disadvantages of selected NRWSSP technologies**

| TECHNOLOGY | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Boreholes and hand pumps | • Simple technology, easy to operate and maintain<br>• Low per capita unit cost for infrastructure construction<br>• Low O&M costs | • Groundwater must be at a reasonable depth (accessible by one of Angola's standard hand pumps)<br>• Relatively low discharge from the pump compared with mechanised systems<br>• Poor availability of spare parts and trained mechanics with the appropriate tools for complex maintenance and repairs |
| Gravity-fed piped distribution | • No pumping required<br>• Few moving parts minimizing O&M requirements<br>• Low O&M costs | • Water source must be above the elevation of the point of use<br>• Capital cost increases as distance to the source increases<br>• Potential for substantial seasonal variations in spring flow |
| Ram pump with piped distribution | • No electricity requirements<br>• Few moving parts minimizing O&M requirements<br>• Low O&M costs | • Specific elevation, terrain and water volume requirements must be met<br>• Capital cost increases as distance to the source increases<br>• Limited efficiency (i.e. need relatively large flow of water from the source) |
| Solar pump with piped distribution | • No outside source of electricity required<br>• Low O&M requirements and costs<br>• Higher level of service than hand pumps<br>• Panel life of 20 years or more | • High capital cost<br>• Borehole yield must be sufficient to meet higher extraction rate necessitated by limited pumping hours<br>• Specialised personnel often required to make repairs<br>• Submersible pumps have shorter lifespans than panels and will need to be replaced to sustain access, incurring a relatively high one-time O&M cost every seven to eight years |
| Electromechanical pump with piped distribution | • Higher level of service than hand pumps<br>• Lower capital cost than a solar system assuming electricity is available nearby<br>• Can pump water from very deep boreholes | • Reliable electricity from the grid is required to power the pump<br>• Borehole yield must be sufficient to meet higher demand<br>• High capital and O&M costs<br>• Complex to operate and maintain |
| Surface water with pump, treatment and piped distribution | • Can provide access to communities where groundwater is not an option, assuming a surface water source is present | • Reliable electricity from the grid is required to power the pump and treatment plant<br>• Chemicals and other consumables required for operation which are not available in rural areas<br>• Very high capital and O&M costs<br>• Complex to operate and maintain |

### 4.1.7 Unit costs for capital investment

The investment plan is based on unit costs per capita for the six selected infrastructure types. Little reliable cost data was available for water infrastructure construction in Angola.

Based on PAT cost data made available by the GoA[10] and data collected for various other countries and extrapolated to Angola, a set of unit costs was calculated for use in the investment planning exercise. Included in the unit costs for construction are the costs of labour, equipment and material for infrastructure construction. Design, construction supervision and other costs are not included in these unit costs and are addressed separately in Section 8.1.2.

Available cost data from Angola and other countries was studied with the purpose of developing the most informed unit costs for capital investment under the NRWSSP. AnnexC outlines the methodology used in developing these unit costs.

The average system and per capita unit costs developed in Annex C are shown in Table 4.3. These unit costs fall within the range of PAT unit costs (Table C-1 in Annex C) and are therefore a reasonable estimate for planning purposes. Included in the unit costs for construction are:

- The costs of labour, equipment and material for infrastructure construction; and
- 70% of capital maintenance costs, including: major repairs or other non-recurrent costs related to asset renewal, replacement and rehabilitation necessary to keep systems running but which is beyond routine maintenance work. Capital maintenance is discussed further in Section 4.1.8 under system O&M costs (communities are assumed to bear the remaining 30% of capital maintenance investment within their fees structure).

As no data for a piped system using a ram pump was available, this was calculated based on the cost for a spring-fed gravity system with the additional estimated cost of a ram pump.

**Table 4.3: Average unit capital costs for water system construction (USD)**

| TECHNOLOGY TYPE | AVG. SYSTEM COST | AVG. NO. USERS / SYSTEM | BASE CAPITAL COST | 70% CAPITAL MAINT. 1 | TOTAL |
|---|---|---|---|---|---|
| Borehole / Handpump | 16,730 | 250 | 66.90 | 1.55 | 68.45 |
| Borehole / solar pump / piped dist. | 95,710 | 650 | 148.20 | 5.45 | 153.65 |
| Borehole / electro-mechanical pump / piped dist. | 318,280 | 2,200 | 144.70 | 5.45 | 150.15 |
| Spring / gravity-fed / piped dist. | 108,390 | 950 | 116.60 | 1.18 | 117.78 |
| Spring / ram pump / piped dist. | 113,390 | 950 | 122.00 | 1.18 | 123.18 |
| Surface water / electromech. pump / treatment / piped dist. | 354,840 | 1,950 | 183.20 | 7.09 | 190.29 |

*1. Capital maintenace for major non-recurrent system repair and improvement (discussed in Section 4.1.8)*

*2. Source: Cowater 2014*

[10] Ministério da Energia e Águas (2012). Programa "Água para Todos" Relatória Mensal No. 35/RM, Junho 2012. Preparado por: Vista Water.

WASHCost has published unit cost benchmarks for water infrastructure[11] derived from the WASHCost dataset (countries of focus: Ghana, Mozambique, Burkina Faso, India) and the best available cost data from other organisations all over the world. The benchmarks are useful for planning, assessing sustainability from a cost perspective and for monitoring value for money. If expenditure is much lower than the benchmarks, then the services being planned or delivered have a high probability of reduced service levels or long-term failure. If expenditure is higher than the maximum range, an affordability check (for both users and providers) might be required to ensure long-term sustainability. However, there may be context-specific explanations for the cost of a basic level of service being outside the benchmark range.

The WASHCost benchmarks for per-capita capital costs are shown in Table 4.4 including the original benchmarks and the values once translated to the Angolan context. The unit costs calculated for Angola for boreholes with hand pumps and boreholes with electric pumps and a distribution system can be compared to the benchmarks. The calculated unit costs fall at the high end of the range, which is reasonable given the context. Firstly, Angola is known to be a very expensive country and costs will be high compared to the WASHCost focus countries. Secondly, construction costs in post-war rural areas are expected to be elevated due to poorly maintained roads, inadequate commercial networks, risks to equipment and personnel, and initial lack of private sector suppliers.

**Table 4.4: WASHCost per-capita benchmark capital costs**

| SYSTEM TYPE | BENCHMARKS IN 2014 USD | | BENCHMARKS TRANSLATED TO ANGOLA IN 2014 USD | |
|---|---|---|---|---|
| | MINIMUM (2014 USD) | MAXIMUM (2014 USD) | MINIMUM (2014 USD) | MAXIMUM (2014 USD) |
| Borehole & hand pump | $ 20.61 | $ 61.82 | $ 24.73 | $ 74.18 |
| Borehole, mechanised pump & small/medium piped scheme (500-5000 users) | $ 30.91 | $ 134.97 | $ 37.09 | $ 161.96 |

It should be noted that unit costs for selected countries are assumed to represent unit costs for those entire countries, which may be unrealistic. Also, for countries with no unit cost data, extrapolation from other countries with data represents a major uncertainty[12]. The unit costs calculated for Angola represent the best estimate possible based on the available data. The costs are high, as indicated by comparing to the WASHCost benchmarks, but realistic given the context.

### 4.1.8 Unit costs for operation & maintenance

The cost of O&M is the responsibility of the beneficiary community and, therefore, it has not been included in the overall NRWSSP investment budget. O&M costs have nevertheless been estimated herein for purposes of information and comparison.

Reliable data on rural water system O&M costs is even less available than cost data for infrastructure investment, and no reliable data from Angola was identified. Instead, cost data from two other countries was studied and a set of unit costs for O&M costs for reference by the NRWSSP was developed using the methodology provided in Annex C.

[11] WASHCost (2012). *Funding Recurrent Costs for Improved Rural Water Services*. WASHCost Infosheet No. 3, December 2012.
[12] Hutton, G. (2012). *Global Costs and Benefits of WSS to Reach the MDGs.* WHO: Geneva, Switzerland.

The average per capita costs of operation and maintenance estimated for Angola are shown in Table 4.5. For each type of system, the table estimates:

- The basic cost of routine minor maintenance, minor repairs and operation of the system (column A).
- Necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability (column B). 30% of this cost has is allocated to communities (column C) and is therefore added to the base O&M cost. The remaining 70% of future capital maintenance costs will be borne by various levels of government, and is included in capital cost calculations (See Section 8).
- The total O&M cost to be covered by the community, calculated as the basic O&M cost plus 30% of the capital maintenance cost (column D).

**Table 4.5: Average unit costs for water system O&M (USD/person/year, 2014)**

| TECHNOLOGY TYPE | BASE O&M COST *A* | FULL CAPITAL MAINT. COST *B* | 30% CAPITAL MAINT. 1 *C* | TOTAL *D=A+C* |
|---|---|---|---|---|
| Borehole / Handpump | 1.11 | 2.23 | 0.67 | 1.78 |
| Borehole / solar pump / piped dist. | 2.78 | 7.77 | 2.33 | 5.11 |
| Borehole / electro-mechanical pump / piped dist. | 5.56 | 7.78 | 2.33 | 7.90 |
| Spring / gravity-fed / piped dist. | 1.05 | 3.93 | 1.18 | 2.23 |
| Spring / ram pump / piped dist. | 1.05 | 3.93 | 1.18 | 2.23 |
| Surface water / electromech. pump / treatment / piped dist. | 10.27 | 23.63 | 7.09 | 17.36 |

*1. Capital maintenace for major non-recurrent system repair and improvement (discussed in Section 4.1.8)*

It is important to note that these theoretical cost estimates represent an ideal scenario in terms of community O&M expenditure required to maintain the infrastructure over the long term.

In practice, user fees should reflect the real expected cost of maintaining each system. This will depend on type of technology and the overall size of the system, as well on the type of arrangement or service agreement made for carrying out operation and maintenance.

Once the Programme is underway, further work will be necessary to establish an approach to tariff structures which is in line with national policy and regulations, and which will provide the community with sufficient funds to pay for adequate servicing.

## 4.2 Sanitation

### 4.2.1 Background

Through STLC and sanitation marketing, the sanitation promotion techniques to be used under the NRWSSP, households must decide to construct their own latrines. Families that have decided to invest in latrines currently have a choice between the basic pit with sanplat and a Ventilated Improved Pit (VIP) latrine. A wider range of options is available and would increase demand and respond to individual household needs as is required under a demand-responsive approach. Trained entrepreneurs and masons can introduce these latrines and toilets first through existing demonstration centres, followed by new demonstration centres in the pilot provinces constructed under the NRWSSP.

The MDG definition of *Basic Sanitation*[13] is the lowest-cost technology ensuring hygienic excreta and sullage disposal and a clean and healthful living environment both at home and in the neighborhood of users. Access to basic sanitation includes safety and privacy in the use of these services. Appropriate designs to meet these basic criteria at low cost should be developed within the NRWSSP. This can be conducted through a participatory design process which enables users to create, identify and select appropriate sanitation technologies. Latrine designs need to respond to the local conditions, both technical (e.g. sandy soil conditions present in some parts of Angola) and social. This includes the market conditions in terms of material availability and the local knowledge of masons and community members. A human centred-design approach[14] can be used in Angola, as was done in Malawi[15], to develop new latrine models or improve on existing models. Once new designs have been agreed on and prototyped successfully, the sanitation masons would be trained in their promotion and construction.

The goal of STLC is for communities to achieve open-defecation free status, through the construction and use of latrines by households that meet the MDG definition for basic sanitation. The goal of the sanitation marketing component is to motivate households to maintain their Open Defecation Free (ODF) status and move up the sanitation ladder, from a basic pit latrine to various improved latrines that provide better service but at increased cost. It is up to the household to select the latrine technology that best meets their needs and preferences while being affordable for that particular family. The technology options recommended for the NRWSSP are described below.

### 4.2.2 Technology Descriptions

**Low-Cost Pit Latrine**

Low-cost pit latrines that meet the MDG definition of basic sanitation will be the most widely constructed under the NRWSSP, at least initially before households have the means and desire to move up the sanitation ladder. Cowater recently conducted a low-cost latrine design exercise in Mozambique which resulted in three affordable latrine designs using local materials which improve on the traditional pit latrine that was being constructed in the country. As an example of what could be designed for use in Angola, these are:

- Type I: Brick pit lining and concrete slab (example shown in Figure 4.3: Affordable latrine designs from Mozambique);
- Type II: C*anhiço* (a local reed used in low-cost construction) pit lining and wooden platform; and
- Type III: Combination of *canhiço* pit lining and concrete slab cover (requires brick ring beam).

[13] http://www.who.int/water_sanitation_health/mdg1/en/

[14] IDEO (2009) Human Centred Design Toolkit, available at www.ideo.com/work/human-centered-design-toolkit/ (accessed 8 April 2014)

[15] Cole, B. (2013) 'Participatory Design Development for Sanitation', *Frontiers of STLC: Innovations and Insights* Issue 1, Brighton: IDS

**Figure 4.3: Affordable latrine designs from Mozambique**

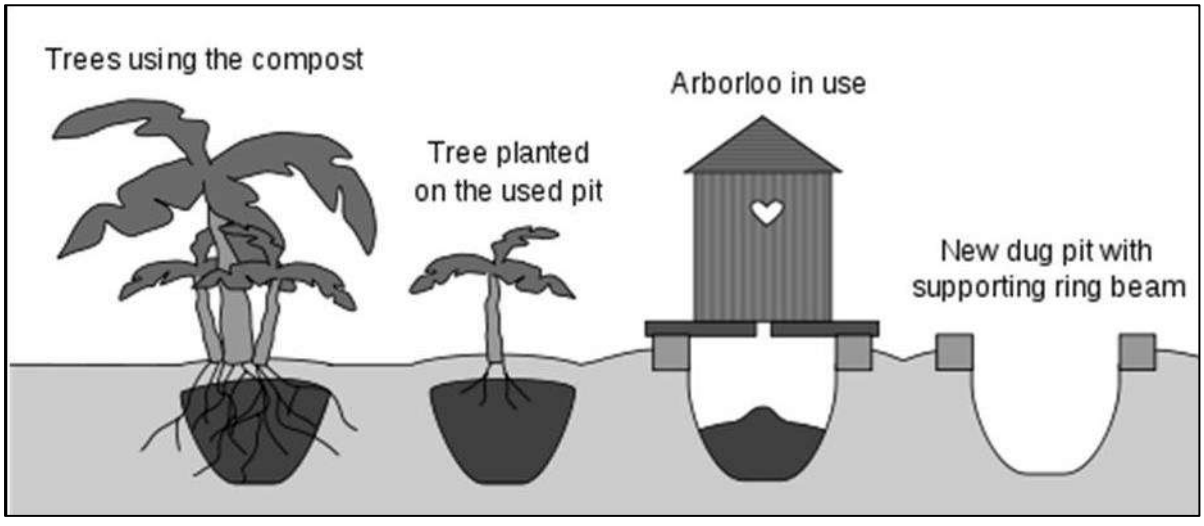
Type I: Brick pit lining and concrete slab

Type II: C*anico* and *macuti* superstructure

## Arborloo

Ecosan latrines (e.g. arborloo) are being widely used in Malawi[16]. and other countries, and should be introduced in Angola as a low cost means of reusing waste as fertilizer and a soil conditioner. The arborloo (Figure 4.4) consists of a single, unlined shallow pit with a ring beam (circular ring of bricks), slab and superstructure. It is used like a normal latrine but with the regular addition of soil, wood ash and leaves. When it is full, it is covered with leaves and soil and a small tree is planted on top to grow in the compost. Another pit is dug nearby and the whole structure is relocated over the new pit. No handling of the waste is required.

**Figure 4.4: Arborloo[17]**




The latrine mason can extend credit to the household in the form of the first product from the tree that is planted (e.g. first bunch of bananas). The fruit has a commercial value which the mason can use to recover his/her costs. The fruit takes time to be produced (e.g. bananas 6

[16] Holm, G. (2007) Final Report on the COMWASH Project in Thyolo and Phalombe Districts, Malawi. Cowater International Inc.

[17] Morgan, P. (2007). *Toilets that make compost: Low-cost, sanitary toilets that produce valuable compost for crops in an African context*. Stockholm Environment Institute, EcoSanRes Program, 2007.

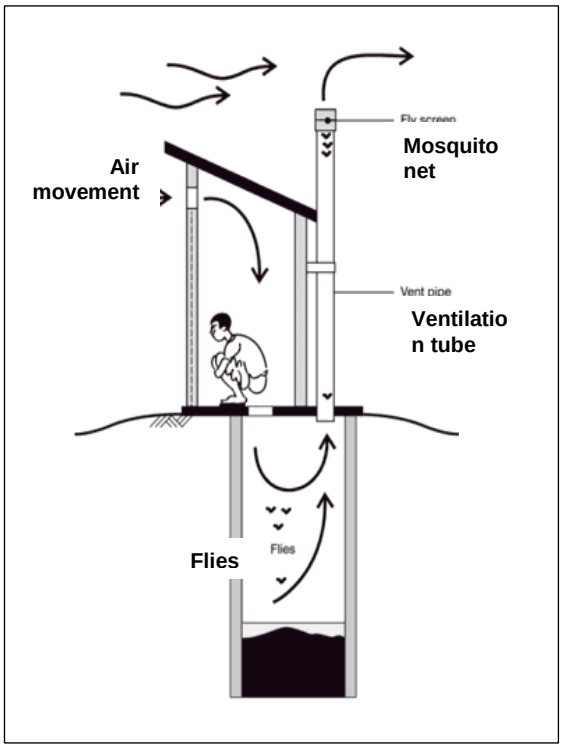
months after filling pit) so there is a waiting period. On the other hand, in this approach no cash is required from the householder.

An alternative to the arborloo is the fossa alterna. This latrine consists of two pits with a superstructure. Use of the pits alternates as each becomes full. The pits require occasional manual pit emptying.

## Ventilated Improved Pit (VIP) Latrine

The VIP latrine was developed to control flies and odours in pit latrines.[18] It does this through air circulation. It is very effective provided it is constructed and maintained properly. It differs from a simple pit latrine in that it is equipped with a ventilation pipe and a more substantial superstructure. The latrine consists of a lined pit, concrete sanitary platform, permanent superstructure and a ventilation pipe. Once full, it is necessary to empty or construct a new latrine.

**Figure 4.5: VIP Latrine**



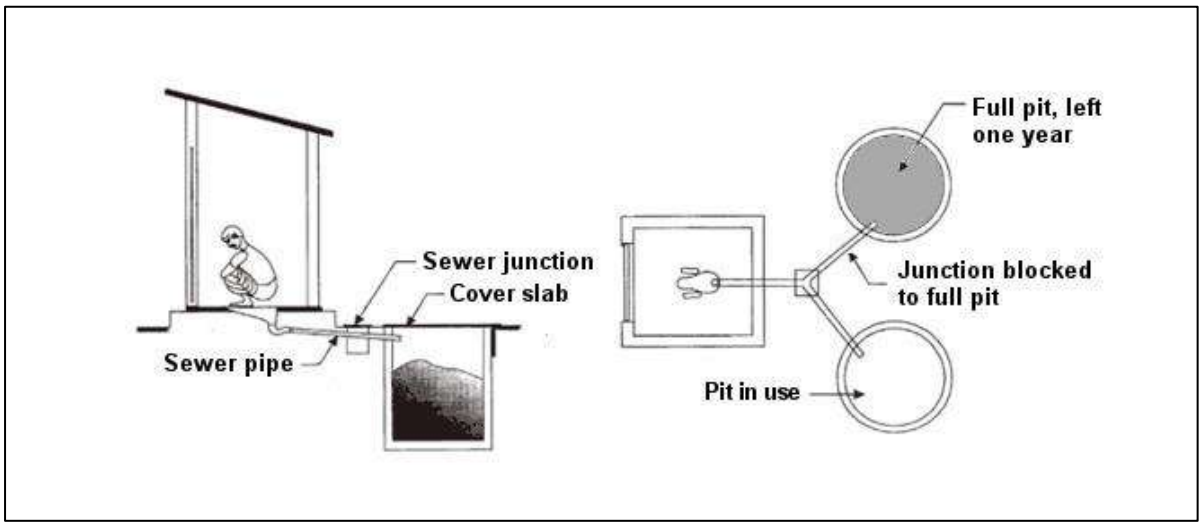

Under STLC, it is not recommended to promote the VIP latrine, unless constructed by a qualified builder. The VIP must be constructed following very specific guidelines to ensure it achieves its intended goals. The vent pipe must have durable fly screen and the interior must be sufficiently dark to deter flies, which often results in children not wanting to use the latrine. The vent pipe must be appropriately sized to allow sufficient ventilation. In addition, the VIP latrine is much more expensive than other pit latrine designs, and is not often selected by the household where subsidies are not provided.

## Double-pit pour flush latrine

The double-pit, pour-flush toilet[19] is widely used in India and Latin America, being popular for its odour-free, child-friendly characteristics. It is appropriate where water supplies are plentiful and reliable. Twin-pit pour-flush toilets allow on-site treatment and transformation of faecal sludge into a hygienized soil compost. The latrine consists of two pits which are linked using a Y-junction, to a single pour-flush toilet (refer to Figure 4.6).

[18] WEDC (2004). *Low-Cost Sanitation: Course Notes*. Loughborough University: Loughborough, UK.
[19] http://www.sswm.info/category/implementation-tools/wastewater-treatment/hardware/site-storage-and-treatments/twin-pits

**Figure 4.6: Double-pit pour-flush latrine**




About 1L of water is used to manually flush the waste through the discharge pipe to one of the pits. The pipe has a U-shaped bend to provide protection from odour. When the pit is full it is blocked off at the Y-junction and the other pit is used. After resting and composting, the dry fertilizer is removed from the pit and used in the garden.

## Latrines for schools and health centres

Latrines for schools and health centres should be accessible to those with disabilities and consider the needs of girls and women, including menstrual hygiene management (spaces for washing, changing, disposal). In schools in particular, latrines must be designed to be child-friendly (e.g. with smaller holes in the platform so that children feel safe). Designs and guidelines exist which meet these needs, such as those from WEDC for inclusive design of school latrines[20]. The facilities should encourage hygienic behaviour, with handwashing facilities provided. Both pit latrines and pour-flush alternatives can be used in either setting.

## Other sanitation options

There are many other latrine options that may be appropriate in specific conditions. These include a raised latrine (e.g. a raised *fossa alterna* latrine) for areas prone to flooding, where groundwater is close to the surface or where bed-rock is located close to the surface. Septic systems are another alternative for households where water is available at the home in sufficient quantities, or where the volume of wastewater to be treated is too large for disposal in a pit latrine. The cost of a septic system, however, is generally prohibitive in a rural setting.

The MDG definition of appropriate sanitation also includes the hygienic disposal of sullage (wastewater from the house, excluding excreta – e.g. washing, cooking, laundry). This can be achieved through the construction of a simple soakaway pit, which allows the water to seep into the soil. This eliminates standing water, which can be a breeding place for flies, mosquitoes and bacteria.

As part of STLC, the importance of handwashing with soap (or ash) will be emphasised. There are various affordable options for handwashing which households can construct

[20] WEDC (2011). *Inclusive Design of School Latrines*. Briefing Note 1- July 2011. Available from: http://wedc.lboro.ac.uk.

themselves. For example, the tippy tap[21] consists of a container hung between two sticks which is connected by a rope to a foot pedal. Soap can be suspended from the bottle. The bottle tips when the foot pedal is pressed, allowing water to flow out of a hole in the upper part of the bottle. Adequate drainage is important to avoid standing water around the tippy tap.

### 4.2.3 Capital, operation and maintenance costs

**Capital costs**

Within the NRWSSP, the cost of construction of a latrine will be borne by the household; no subsidies will be provided. This is in keeping with the principles of STLC and sanitation marketing. It is expected that most households will begin by constructing a low-cost pit latrine. Estimated unit costs for construction for the recommended latrine technologies are indicated in Table 4.6. The table includes two costs: the first is the unit cost for construction including the cost of materials and labour, assuming households will procure the services of a latrine mason to assist in construction. The second cost is the unit cost for construction assuming the household provides most of the labour. A household can minimise costs by sourcing local materials, and minimising the involvement of the mason, for example by digging the pit and constructing the superstructure themselves. The cost for constructing latrines has not been included in the investment plan, however the cost of the sanitation promotion component of the NRWSSP is included in Section 8.2.

**Table 4.6: Unit costs for construction of latrine technologies**

| LATRINE TYPE | DESCRIPTION | COST PER LATRINE (MATERIALS & LATRINE MASON LABOUR) | COST PER LATRINE (LOCALLY SOURCED MATERIALS & HOUSEHOLD LABOUR) |
|---|---|---|---|
| Pit Latrine – Type 1 | Brick-lined pit (clay or mud brick), concrete slab and superstructure of local materials | USD 50 | USD 20 |
| Pit Latrine – Type 2 | Pit lined with local materials, wooden platform and superstructure of local materials | USD 40 | USD 15 |
| Arborloo | Shallow unlined pit with ring beam, concrete slab and superstructure of local materials | USD 30 | USD 15 |
| VIP | Brick-lined pit (Clay or mud), concrete slab, permanent superstructure with ventilation pipe | USD 225 | n/a |
| Double-Pit Pour Flush | Two pits lined with brick, pour-flush toilet, permanent superstructure (mud /clay brick) | USD 100 | n/a |

The above costs are based on information obtained from Angola[22], which was then compared with cost information from other countries and the WASHCost benchmarks for latrine construction, and adjusted accordingly. The costs represent reasonable estimates for latrine construction within the Angolan context and serve as an indication of what households may expect to pay for a latrine.

[21] Refer to www.tippytap.org for instructions on its construction.
[22] Baptista, Edson (2014). Personal communication.

**Operations and maintenance costs**

Operations and maintenance costs for the latrines are minimal and are to be covered by the household. For all latrine types, regular cleaning is required and potential small repairs may become necessary over the life of the latrine. There would be limited to no cost for these activities.

The more substantial recurrent cost occurs, for pit latrines and VIPs, when the latrine is full and it needs to be emptied or re-constructed / moved. At this time pit emptying services do not exist in the rural Angolan context, thus the recurrent cost will be equivalent to the construction cost of the latrine, subtracting any materials that can be re-used. Depending on the depth of the pit and the number of users, the low-cost pit latrines are expected to fill within two to five years. Once full, the household will be required to dig a new pit and move the superstructure of the latrine. Over time, as the contents of the original pit decompose, it may be possible to re-use it for a future latrine. If most materials are re-used, the cost to construct a new latrine would be approximately USD 5-10 for a low-cost pit latrine or arborloo. The cost to construct a new VIP would be significantly higher, as additional labour would be required to re-construct the entire latrine and its superstructure. The double-pit pour-flush latrine does not need to be re-constructed as two pits are included in the design and use of these alternates as the pits become full. However, the pit needs to be emptied prior to its re-use, therefore once the sludge has had time to compost the household would need to provide the labour to empty the pit.

## 4.3 Supply chain strategy

### 4.3.1 Constraints to a sustainable supply chain

The sustainability of the infrastructure to be constructed under the NRWSSP will be dependent on regular maintenance and timely repairs when breakdowns occur. A major cause of poor sustainability of rural water infrastructure is that supply chains do not exist to allow customers to purchase spare parts locally at an affordable cost, particularly for hand pumps. There are a number of fundamental reasons why hand pump spare part supply chains break down, namely[23]:

- limited profit resulting in lack of commercial viability;
- different procurement procedures used for pumps and spare parts;
- government and donor policies or strategies that subsidise equipment and services; and,
- dependence on community-based maintenance systems which require supply chains to reach remote, sparsely populated areas.

The key driver for a sustainable private sector supply chain is adequate demand. This depends heavily on population density and the replacement rate of spare parts[24]. In rural areas, where the population is disperse, these drivers are often not present. Particularly following a large hand pump campaign where many new pumps are installed and a stock of spare parts provided to communities, demand for spare parts is low which slows the ability of the private sector to develop a sustainable supply chain. Additionally, the profitability of spare parts tends to be low, further decreasing the incentive of suppliers to stock them.

[23] Harvey, P. (2011). *Sustainable Supply Chains for Rural Water Services*. RWSN Field Note No. 2011-1, February 2011.
[24] Oyo, A. (2006). *Spare Parts Supplies for Hand Pumps in Africa*. RWSN and WSP Field Note, October 2006.

In Angola, pumps/parts suppliers have little interest in establishing locations in the provinces for three reasons[25]:

- GAS lack resources to buy parts;
- high transportation costs to get the parts to the provinces, decreasing profitability; and
- supplier problems (bankruptcy, changing suppliers) reduce the confidence and interest of suppliers in the market.

Based on the assessment conducted during Phase 1 of the preparation of the NRWSSP, spare parts are seldom in stock in the provinces and mechanics are only able to provide service to hand pumps that are installed in close proximity to the municipal seat due to a lack of transportation. The PAT-TA has identified the unavailability of spare parts as a constraint to hand pump functionality[26]. However, no specific strategy or approach has been proposed, adopted, or tested by PAT during its lifetime.

### 4.3.2 Roles and responsibilities

A sustainable supply chain for spare parts is one element of successful post-construction support (PCS). Under MoGeCA the municipality, through its BMEA or EMEA, is responsible for providing regular backstopping to GAS groups. Under this model, the GAS is responsible for preventative maintenance and simple repairs and maintaining a stock of spare parts for these tasks. They are to report major service problems and request assistance from the BMEA technician for complex repairs. The BMEA or EMEA is responsible for repairing and maintaining the works using a payment for service approach (i.e. the GAS pays for parts and services), stocking spare parts, conducting a yearly inventory of spare parts suppliers, and with DPEA and/or DNA developing a system to import and supply spare parts if gaps exist.

A second option will also be implemented under the NRWSSP, consisting of a PPP model where the responsibilities of the BMEA are contracted to a private sector firm or entrepreneur. For hand pump maintenance and spare parts supply, this could take the form of hand pump mechanics who are identified and trained to operate a repair and parts supply business.

Any maintenance scheme planned can only be successful if there is a ready supply of spare parts available. However it is unrealistic to assume that municipal or private sector agents can resolve the spare parts problem without a national policy and framework in place. It is the role of DNA to coordinate the spare parts supply chain, and to develop a national policy and framework to maximise the sustainability of the supply chain in rural areas.

### 4.3.3 Supply chain strategy for NRWSSP

Post-construction support, of which the spare parts supply chain is one element, will be strengthened under the NRWSSP. The DNA-TA has proposed a framework for the control and procurement of hand pump spare parts. The framework outlines the roles and responsibilities of the various stakeholders to ensure the supply of spare parts, with funding from a central maintenance fund that will be established. However, parts of the framework are overly complex, such as the spare parts monitoring scheme proposed (requiring monthly reporting by the GAS). It is recommended that this framework be implemented with some simplifications. Emphasis under the NRWSSP will be placed on technology standardisation, quality assurance, and development of a spare parts supply policy. Funding for developing the supply chain will come from the NRWSSP until such time as the central maintenance

[25] DNA TA (2012). *MGP.5.3. Ficha - modelo de controlo e compra de peças sobressalentes das bombas manuais*. October 2012.
[26] MINEA (2012). *Relatorio Trimestral, Programa Àgua para Todos, 1 Trimestre 2012.* Luanda.

fund has been established. The spare parts supply chain must function within the existing sector framework including the expected changes as MoGeCA rolls out. Refer to the NRWSSP Operations Manual for additional details.

**Technology standardisation**

A draft national policy for hand pumps in Angola was prepared by SKAT in April 2009 with the assistance and support of UNICEF, Development Workshop and the EU. A refined version was later presented to DNA. The policy made recommendations on the standardisation of hand pumps, selected types of hand pumps, their supply, installation, maintenance and repair. The document forms part of MoGeCA, which was officially adopted by MINEA in 2012. DNA should coordinate implementation of the policy and ensure that all sector stakeholders are aware of it and adhere to it.

Technology standardisation simplifies the supply chain requirements and improves its financial viability because it limits the number of types of spare parts, decreases the effort required for quality control, and reduces the complexity of training for GAS and mechanics. All hand pumps installed under the NRWSSP (and in any other water project in the country) should be one of the three recommended standard hand pumps (Afridev, Volanta, and Vergnet).

In the case of the Volanta and Vergnet, proprietary models with in-country representation, an MOU is recommended between DNA and the country representatives that documents their responsibilities. This might include the granting of a term of exclusivity in exchange for expanded services by the private pump manufacturers / distributers.

The Afridev hand pump is a public domain pump. Hand pumps and pump components should be procured through a local supplier (e.g. Habitec) to improve the local supply chain. If organisations procure pumps directly from suppliers overseas, the local supply chain is circumvented and will not improve over time. Under the NRWSSP, a national tender for the regular supply of spare parts for the Afridev should be developed by DNA to ensure the supply of the parts at a reasonable cost. A regional tender should also be considered as a means of developing additional supply chain options with closer ties to specific provinces.

**Quality assurance**

The quality of hand pumps and spare parts is of utmost importance in maximizing sustainability of the infrastructure. Many hand pumps fail due to poor materials and inferior quality of pump components, materials that do not meet the specifications, incorrect dimensions, poor joints, etc. At present there is very limited capacity for quality control of hand pumps and parts in Angola and inspection procedures are inadequate. Materials (metals) testing can be conducted at the new Laboratory of SGS[27] in Luanda, however the facility does not have the capability to test hand pumps, which require dimensional testing. There are presently no facilities available in Angola for this purpose.

It is therefore left to the suppliers who import the pumps to ensure they are of good quality and the contractors who install the pumps to inspect and install them correctly. To ensure that hand pumps are manufactured to high quality standards, the technical specifications for water supply projects should refer to the latest Rural Water Supply Network's (RWSN) hand pump standards for the Afridev hand pump which is a public domain pump and the most common in Angola. The other two standard hand pumps (Volanta and Vergnet) are private domain hand pumps, manufactured only in Europe, therefore specifying these pumps necessitates that they be built to the respective company's standards.

[27] Inspection, Verification and Testing Organisation with locations around the world

It is advised that pumps be inspected by a reputable inspection agency prior to shipping, such as SGS or Bureau Veritas. These two independent inspection services have offices in Luanda and are active worldwide. They can be hired to execute a pre-shipment inspection at the hand pump manufacturer's premises. On arrival in Angola, the pumps should be fully inspected by the importer and a government representative and any deficiencies corrected.

Installation of hand pumps is a critical step in the construction of the water points. If the pumps are not installed properly they are more likely to fail early. As part of the provision and installation of hand pumps, contractors will be required to install the pumps according to the manufacturer's installation instructions, such the latest Afridev Hand Pump Installation and Maintenance Manual. Careful supervision will be required during this process.

**National spare parts policy**

The role of a supply chain is to deliver the correct goods and/or services to the user, at the right time, cost, and quality. A national policy and framework is required to achieve this. Under the NRWSSP, DNA will prepare and implement a national spare parts policy for hand pumps, and other rural water supply technologies of limited application such as ram pumps, submersible pumps and appurtenances, etc. This should include development of a timeline for the phase-out of government subsidies for spare parts supply chains. A study in the pilot provinces can be conducted to characterise and assess the situation with regard to hand pump maintenance and repair to supplement this information if needed.

Once a policy is developed and approved, it must be rigorously enforced, preferably by the DPEAs. Over time, changes in technology may require the re-evaluation of approved pump models, and it is expected that the hand pump policy would include provisions for the introduction of improved technologies, the evaluation of existing technologies, and the continuous collection and assessment of hand pump maintenance and spare part usage data.

# 5 SANITATION AND HYGIENE

## 5.1 Background

Progress towards achieving sanitation and hygiene targets is lagging behind water supply in Angola. The GoA has begun to address this through the adoption in the draft Sanitation Policy of Community-Led Total Sanitation (STLC) for rural sanitation promotion. UNICEF has been working closely with five provinces to develop and refine the STLC method in the Angolan context and continues to follow up on the progress of the STLC programme in these provinces. The GoA has led the introduction of STLC in four additional provinces to date. Therefore, a total of nine provinces have on-going STLC campaigns at varying stages of implementation (Huila, Cunene, Moxico, Bié, Namibe, Benguela, Lunda Sul, Kwanza Sul and Huambo[28]). Work in Huila Province in particular, as the longest-running programme, serves as a useful and timely pilot on which rural sanitation can be based and scaled up in other provinces.

The NRWSSP sanitation component draws on the experiences to date in Angola, and builds on these with further emphasis on sanitation marketing, improving the supply chain, and downstream campaigns to sustain improvements in sanitation. STLC is effective at initiating behaviour change, while sanitation marketing, underpinned by behaviour change communication, addresses the longer-term marketing of sanitation and the sanitation supply chain. Hygiene promotion should be integrated into these approaches. Successful implementation and sustainable results rely heavily on political commitment, awareness raising and advocacy through workshops, training, monitoring, and review with feedback. Refer to the Operations Manual, Section 6, for a detailed description of the implementation methodology for the sanitation component of the NRWSSP.

## 5.2 Key principles

The following key principles form the framework within which the sanitation and hygiene component of the NRWSSP has been defined:

- *Strengthened Enabling Environment*: A strong enabling environment at national, provincial, municipal and communal levels is required that will be capable of implementing a sanitation programme at scale.
- *Combined Approaches to Change Sanitation Behaviour*: Community-Led Total Sanitation (STLC), sanitation marketing and behaviour change communication approaches, used in combination, enable demand creation, behaviour change and increased supply of products and services[29].
- *Complementarity of Water Supply, Sanitation and Hygiene Promotion*: Water supply, sanitation and hygiene interventions should be done simultaneously where all are needed. This demands close coordination among all stakeholders.

## 5.3 Organisational structure

Currently, the Ministry of Environment (MINAMB) holds responsibility for rural sanitation. It has established the National Technical Unit for Environmental Sanitation/Intersectorial Technical Group (UTNSA/GTI), with representatives from MINSA, MAT, MINED, SEA and UNICEF, as being responsible for policy, strategy, legislative, regulatory and standards development as well as quality control and monitoring at the central level, for sanitation and

[28] Baptista, Edson. (2014). Personal communication.
[29] Perez, E. et al. (2012). *What does it take to scale up rural sanitation?* WSP, July 2012.

hygiene promotion. As a newly-created unit, the UTNSA is currently under-staffed and under-budgeted. As a separate entity from DNA, which is housed within the Ministry of Energy and Water (MINEA), there is currently insufficient coordination between the rural water and sanitation sub-sectors. Under the NRWSSP, stakeholders will be assisted to work towards better coordination through technical assistance and capacity building. Coordination in the sector is essential to efficient and sustainable sanitation and hygiene promotion. The UTNSA/GTI has been established to this end. The PMU will support the organisation to improve coordination in the sector, specifically with DNA through the implementation of the NRWSSP. DNA, as the lead agency for the NRWSSP, will be responsible for working with MINAMB on the sanitation component of the Programme, and ensuring proper coordination between the water and sanitation components, with roll out of each in parallel and following a similar methodology.

At the provincial level and below, organisational structures vary from province to province. The Huila Province sanitation programme is the most developed, having been the launch point for a UNICEF-led Open-Defecation Free (ODF) programme utilising the Community (STLC) and School-Led Total Sanitation (STLE) approaches. In Huila an ODF Committee has been established directly under the Provincial Governor. It works through an executive committee which in turn functions through four subcommittees: (1) social mobilisation; (2) training; (3) monitoring and evaluation (M&E); and (4) technical[30]. At the municipal and *comuna* levels, similar committees exist, each with an ODF Committee and two sub-committees: monitoring, and social mobilisation. Representatives of all stakeholders (MINAMB, Provincial Department of Energy and Water (DPEA), Ministry of Education (MINED), Ministry of Territorial Administration (MAT) and UNICEF) are members of these committees, with the aim of enhancing coordination between the various agencies with responsibilities in rural sanitation. At the municipal level there is also a Mobiliser, whose salary is subsidised through various projects and government programs depending on the source of funding, who works with *comunas* to implement the STLC approach. STLC is now being implemented in eight provinces and, as such, similar organisational structures now also exist in the provinces of Cunene, Moxico, Bié, Namibe, Benguela, Lunda Sul and Huambo[31].

Within this committee-based structure, roles and responsibilities can be unclear. For example, it is not clear who holds ultimate responsibility for implementing the sanitation campaign. The committees are formed of existing personnel, and aside from the Mobiliser, are not dedicated to the sanitation programme. The structure is weak because committee members are not paid for their involvement and are therefore not committed to the programme. There has been no definitive assessment of the committee system and an assessment should be conducted prior to accepting it as the norm for the country. The committees must be efficient, effective, and integrated into the existing framework, to sustainably implement a sanitation campaign over the long-term. Particularly at the municipal level, as the entity responsible for local level service delivery and therefore implementation of the sanitation promotion campaign, the structure needs to be strengthened and improved and coordination enhanced.

The GoA has committed to scaling up the STLC strategy nationally. The committee structure, although with weaknesses, has become the accepted framework for STLC in Angola. Therefore under the NRWSSP, based on the outcomes of the assessment, the committee structure will be modified as necessary and then rolled out first in the pilot provinces and then nationally. Where the committees already exist, assistance would be

[30] Governo da Provincia da Huila. (2011). *Huila: Provincia Sem Defecação ao Ar Livre, Plano de Acção.* Lubango: 2011.
[31] Baptista, Edson. (2014). Personal communication.

provided to re-structure and reinforce them. In addition, mechanisms, where these don't already exist, should be created to coordinate activities and establish partnerships between the public, private, and NGO sectors and between communities and local governments.

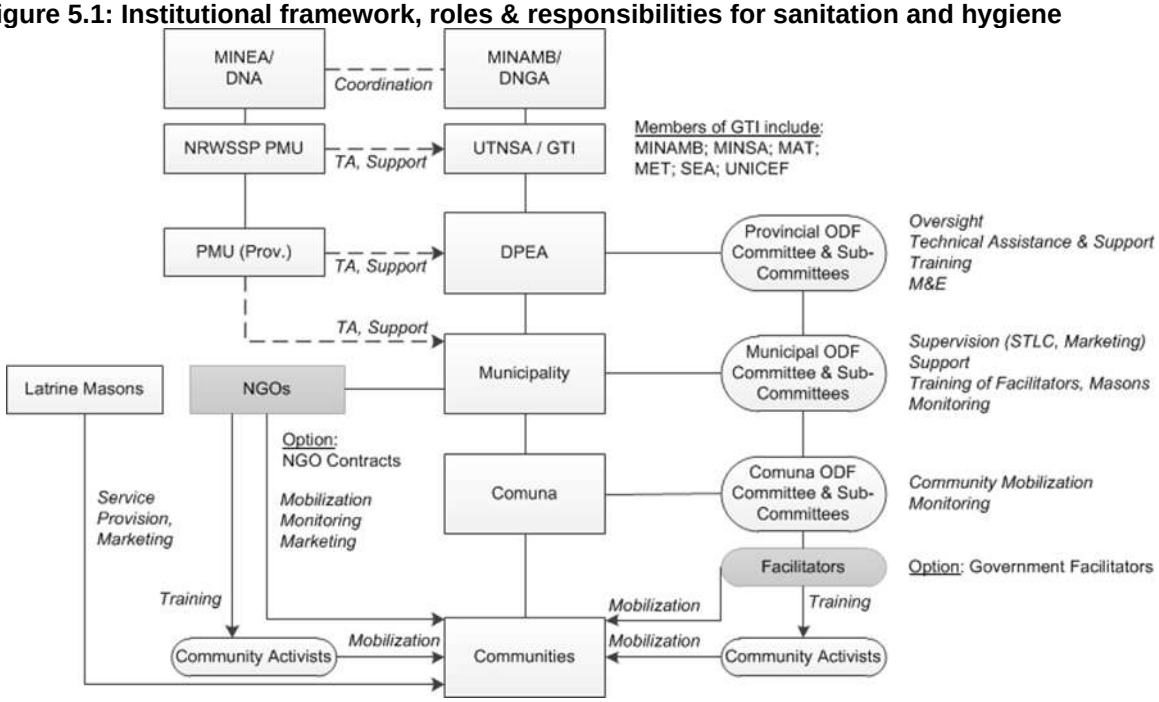
## 5.4 Roles and responsibilities

Currently, integration starts at the top with coordination between the various stakeholders (MINAMB, MINEA, Ministry of Health (MINSA), MINED, and MAT) through the UTNSA/GTI. The NRWSSP sanitation and hygiene component will be implemented under the leadership of the UTNSA/GTI at MINAMB, and coordinated closely with DNA as the NRWSSP rolls out, and with MINSA as necessary regarding hygiene interventions, with support from the PMU. Line ministries will work through the provincial administrations for outreach to the municipal administrations, including their technical and social sections, as well as any existing or developing Municipal Energy and Water Brigades (BMEAs) / Municipal Energy and Water Utilities (EMEAs). Within MoGeCA, hygiene education falls to the GAS with support from the Social Mobilisers of the BMEAs.

Under the NRWSSP, municipalities and *comunas* will retain their central role in managing, administering and advocating sanitation and hygiene, and be strengthened to adequately carry out this role by the NRWSSP PMU teams. Within Angola's decentralization context, municipalities are responsible for service delivery, and will therefore be the focal point for the sanitation component of the NRWSSP, leading sanitation promotion at the local level. The provincial level will be responsible for supervision, coordination and monitoring, as well as providing technical assistance and support. Where local NGOs exist, an alternative to government facilitators can be used where NGOs are contracted by the municipality for community mobilisation, monitoring and marketing. It will be important to ensure, where NGOs are contracted, that the knowledge and skills are transferred to the government during the programme such that they are able to carry out their roles and responsibilities once the NGO contracts are complete. The private sector, in the form of sanitation masons and entrepreneurs, will continue to be key elements in expanding sanitation. They will be integral to marketing sanitation, and will be hired by households for latrine construction.

Figure 5.1 illustrates the institutional framework, roles and responsibilities for the sanitation component of the NRWSSP.

**Figure 5.1: Institutional framework, roles & responsibilities for sanitation and hygiene**



The ODF committees being established at provincial, municipal and *comuna* level currently have the roles and responsibilities outlined in Table 5.1. This structure may be revised based on the outcomes of the assessment.

**Table 5.1: Roles and responsibilities of ODF committees**

| ODF COMMITTEE | ROLES & RESPONSIBILITIES |
|---|---|
| PROVINCIAL LEVEL | |
| 1. Provincial ODF Committee | Coordinate the various sub-committees; include budget for sanitation in provincial budget; promote sanitation within the province. |
| 1.1 Executive Sub-Committee | Provide institutional and technical support through provincial sub-committees to municipal and *comuna* administrations; coordinate and communicate with stakeholders; review monthly reports from sub-committees. |
| 1.1.1 Training Sub-Committee | Provide training and resources / equipment to trainers, mobilisers, facilitators and other stakeholders; prepare training materials for use at municipal level; monitor and report on training. |
| 1.1.2 Social Mobilisation Sub-Committee | Support municipal social mobilisation committee; prepare and produce tools and materials for municipal sub-committee; oversee and report on social mobilisation activities. |
| 1.1.3 Technical Sub-Committee | Provide technical support to provincial and municipal sub-committees; supervise implementation of STLC. |
| 1.1.4 Monitoring & Evaluation Sub-Committee | Prepare baseline study; implement M&E tools provided by Executive Sub-Committee; provide technical support to municipal M&E sub-committees; evaluate communities that have declared themselves ODF[32]; monitor, evaluate and report on programme progress. |
| MUNICIPAL LEVEL | |
| 2. Municipal Committee | Oversee and provide support to municipal sub-committees; conduct municipal workshop; report to provincial sub-committees. |
| 2.1 Social Mobilisation Sub-Committee | Identify and assist in training of municipal facilitators to implement the approach in communities (2-3 per municipality) who will then identify and train local volunteers to assist in triggering at community level; support social mobilisation activities at local level; oversee community level communication.<br>*Mobiliser* supports the STLC approach at community level and conducts follow up; monitors municipal and *comuna*-level facilitators; acts as a bridge between communities and municipality. |
| 2.2 Monitoring & Evaluation Sub-Committee | Provide support to *comuna* sub-committee; supervise process of community mobilisation; coordinate monthly monitoring of programme at community level. |
| *COMUNA* LEVEL | |
| *3. Comuna* Committee | Oversee and provide support to *comuna* sub-committees; conduct *comuna*-level workshop. |
| 3.1 Social Mobilisation Sub-Committee | Facilitate and activate communities to become ODF; Follow up with local leaders. |
| 3.2 M&E Sub-Committee | Supervise STLC implementation in communities; Collect data and report to municipal sub-committee. |

Sufficient resources will be are required at each level to enable successful implementation of the sanitation programme. Transportation (e.g. vehicles) and financial support are required

[32] ODF is defined as all families in a community having access to an alternative to open defecation. In the first instance, this will likely consist of basic latrines. In the long-term, the aim is to achieve sustainable sanitation using latrines meeting the MDG definition for improved sanitation.

to allow personnel to conduct mobilisation, monitoring and follow up activities. Specific requirements for these resources will be defined as part of the assessment of the committee structure.

## 5.5 Enabling environment

### 5.5.1 Sanitation policy and strategy

Recent efforts toward the creation of policy for rural sanitation started with the development of a preliminary National Environmental Sanitation Policy (2011)[33]. This work was modified into a draft policy for government review by MINAMB/UTNSA in collaboration with MINEA, MINSA, MINED, MAT and the Ministry of Agriculture and Rural Development (MINADERP), using support from the MDG Fund and the EU. The environmental sanitation policy has been approved but has not yet been published - the final step in the legislative process. The policy addresses the issues of solid waste, drainage, wastewater, and hygiene in both the rural and urban contexts. It defines the institutional and legal frameworks, guiding principles, objectives, goals and minimum levels of service.

The policy is comprehensive, but provides limited attention to rural sanitation and hygiene. For planning purposes it cites the rural sanitation MDG coverage target of 53%, and calls for all legislation required under the policy to be in place by 2012 and an approved action plan by 2013. The sector is now behind by two years with respect to these goals, and there is no action plan under preparation for STLC. In terms of strategy, the policy endorses STLC and STLE, but provides no specifics, which suggests that the UNICEF-developed model will continue to be used. Hygiene promotion is listed as a responsibility of the UTNSA. It also sets out basic recommended levels of service which for rural sanitation are: Sanplat; VIP latrine; and Ecological Latrine. Far greater detail is required for the policy framework to become an effective tool for strategy development, action planning and meeting the MDG and post-MDG targets.

Under the NRWSSP, a national rural sanitation strategy and action plan should be developed, using the sanitation policy and the programme proposed herein as guiding documents. Currently there is no official strategy for rural sanitation, however STLC is being championed by MINAMB and is therefore the approach recommended in this programme. One of the gaps at the national level is the lack of financial support for other sanitation activities outside of STLC. To be effective STLC should be accompanied by a sanitation marketing campaign and improvements in the sanitation supply chain. Hygiene promotion must also be taken into account and integrated into the sanitation campaign. The national strategy and action plan should be clear not only about STLC as the first step in providing basic sanitation but also about the next steps in the process and how sustainable results will be achieved.

### 5.5.2 Policy of complementarity of water supply, sanitation and hygiene promotion

The development of a policy of complementarity of water supply, sanitation and hygiene would assist in the coordinated functioning of the sector and the achievement of sustainable improvements in public health. The process of developing this policy should be managed by MINEA/DNA jointly with MINAMB and MINSA, possibly through a joint steering committee (e.g. UTNSA/GTI) or similar means. The following activities are necessary:

- clear definition of what this policy means;
- generation of an initial set of methodologies for policy implementation;

[33] Ministério do Ambiente (2011). *Draft de Política Nacional de Saneamento Ambiental de Angola*. Luanda.

- dissemination of the policy and its methodologies;
- testing of the implementation methodologies;
- follow-up monitoring and review of the testing activities; and
- finalisation of the policy and its implementation methodologies for roll-out at scale.

Since sanitation and hygiene are the joint purview of the Ministry of the Environment (MINAMB) and DNA, with some elements falling under the jurisdiction of the Ministry of Health and Ministry of Education, the application of this principle demands close coordination among stakeholders. Under the NRWSSP, stakeholders will be assisted to work towards better coordination through technical assistance and capacity building, particularly through support to the UTNSA/GTI. Implementation arrangements will take this principle into account, recognising the fractured nature of the sanitation and hygiene sub-sector at present and assisting to make improvements.

### 5.5.3 Building awareness for rural sanitation and hygiene

One of the main policy issues to be addressed concerns the low degree of awareness and understanding of rural sanitation and hygiene at ministerial and senior official levels. It is readily apparent that, at these levels, sanitation is thought of as urban sewerage and solid waste management. Rural sanitation and latrines are given little importance. Additionally, the subject of defecation is seen as a taboo. In order to succeed, the NRWSSP will demand commitment to sanitation and hygiene from the highest levels. This includes parliament, the president's office, the cabinet, executive programmes, and key ministries including MINAMB, MINEA, MINSA and MINED along with their respective provincial directorates. Political commitment and willingness to support STLC is essential and must be maintained throughout the project. This has begun with the development of the Sanitation Policy and its endorsement of STLC for achieving rural sanitation targets, as well as its references to financing and dissemination of policies and strategies. However, provincial officials need more orientation, advocacy and training. Lack of preparation of officials results in low political and administrative understanding and commitment. Local senior officials must actively promote the process. To achieve this, the following activities are recommended:

- instituting a rural sanitation and hygiene awareness campaign (such as a national sanitation day);
- advocacy and demonstration centres in each province;
- provincial and municipal sanitation and hygiene workshops aimed at policy-makers, implementing agents, community organisations and the private sector;
- videos and pamphlets distributed across government advocating rural sanitation and hygiene to educate and raise its profile; and
- rural sanitation and hygiene established as a regular line item in provincial and municipal budgets.

### 5.5.4 Budgetary allocations for rural sanitation

To be sustainable, STLC programmes need to be supported by consistent and reliable budgetary allocations. A successful sanitation and hygiene promotion programme is not a one-off activity requiring short-term investment, but a long-term programme requiring political commitment and regular funding. The GoA has not yet established rural sanitation as a regular budgetary line item. This is because rural sanitation programming has not received official recognition from the highest levels. Being a pilot, the activity has, to date, almost been informal in nature. It suffers as a consequence. Funding is currently provided by the EU to MINAMB (UTNSA) which is then outsourced to NGOs. Provinces and municipalities provide limited counterpart funding and resources. Budgetary support should be standardised by, for example, establishing a percentage of all water supply project funding to

be allocated to sanitation and hygiene, irrespective of the funding source. It also needs to be regularised at the provincial, municipal and *comuna* levels through legislation and contextualised regulations. MINAMB should be funded from the central government but the majority of funds need to be allocated to local government as the programme implementers. A major change is required at all levels of government to ensure adequate commitment and regular funding is achieved. As part of the NRWSSP, awareness raising and planning meetings will be held at all levels. During these meetings, regularising funding through regular budget allocations should be discussed and agreed upon. Commitment from the government will then be sought to implement the mechanisms needed to achieve this.

### 5.5.5 Capacity building

Sector organisations at all levels are weak in capacity and lack adequate resources for sanitation and hygiene promotion. Most have few staff to manage sanitation programmes. Lack of staff, skills, equipment, tools and experience make it difficult for them to fulfil their responsibilities and the increased challenges ahead under the NRWSSP. Building capacity among stakeholders in the rural sanitation and hygiene sector will assist in improving the enabling environment and will be essential to sustaining improvements in sanitation and hygiene over the long term. Sanitation and hygiene promotion will be an integral part of the institutional development and capacity building plan of the NRWSSP. The PMU, located within DNA, will coordinate its sanitation and hygiene-related activities with MINAMB.

Currently there is insufficient capacity to operationalise STLC at large scale in the country. Technical assistance and capacity building is required, at all levels, in the following areas to enable implementation of a national-scale sanitation programme[34]:

- Policy, strategy, and direction;
- Institutional arrangements;
- Human resources development;
- Programme methodology;
- Implementation capacity;
- Availability of products and services;
- Financing and incentives;
- Cost-effective implementation; and
- Monitoring and evaluation.

At the provincial and municipal levels in particular capacity needs to be developed in the full range of roles and responsibilities required to implement the sanitation programme and that capacity must be institutionalised through the development of tools and processes as well as the provision of equipment. Financing for training must be transferred to government as a regular budget line item while implementation of training activities must become institutionalised within the provincial governments and the national water training centre.

A training of trainers approach is recommended, with emphasis on training skills for the trainers. This can be conducted within the modified committee structure to be established for STLC implementation, as long as the committees (or other recommended institutional framework) become institutionalised within their respective government bodies. Training materials and tools for STLC implementation have already been developed in Angola. These should be reviewed and improved if necessary. As STLC has not included a significant sanitation marketing component to date, this aspect of the materials and tools will be

[34] Perez, E. et al. (2012) *What Does it Take to Scale Up Rural Sanitation?* WSP, July 2012.

expanded. The training materials and tools should be standardised for provincial, municipal and *comuna* levels.

Finally, capacity building within the NRWSSP must include means for provinces and municipalities to share experiences. Peer-to-peer learning is an important method for building knowledge and capacity. Sharing experiences and identifying successes, weaknesses and lessons learned can assist personnel to better understand key principles and methodologies. It enables them to return to their jurisdiction and improve their programming based on what they have learnt.

## 5.6 Core approaches for sanitation and hygiene

The core approaches for achieving improvements in hygiene and sanitation within the NRWSSP are STLC and sanitation marketing, managed by the municipality with support from the Province and MINAMB. The NRWSSP Operations Manual describes the detailed implementation methodology for sanitation and hygiene promotion and its scale up. The investment plan (Section 8) details the budget allocations required to implement the sanitation component of the NRWSSP. At 11% of the total Programme budget, the allocations are reasonable considering the approach is based on promotion and behaviour change with no household subsidies and little infrastructure construction (only some public latrines and demonstration centres).

### 5.6.1 Community-led and school-led total sanitation (STLC & STLE)

STLC is a community mobilisation process assisted by facilitators and community leaders, focusing on the community as a whole rather than on individual behaviours. The process aims to ignite or “trigger” a change in sanitation behaviour rather than focusing on constructing toilets. The community is empowered and decides together how they will improve their community to benefit everyone. The following series of steps encompasses the STLC approach, although these can be customised to the context as necessary[35]:

- Pre-triggering: community selection; building rapport;
- Triggering: participatory sanitation profile analysis; “triggering” moment, based on stimulating a collective sense of disgust and shame, when community decides to take action;
- Post-triggering: action planning by community, follow-up support for latrine construction; and
- Scaling up and going beyond STLC: sanitation marketing; improvements in supply chain; families move up sanitation ladder.

As a supporting activity, schools should be involved in the mobilisation process. School-led total sanitation (STLE) targets schools in the selected communities for facilitation and triggering. Young people become change agents in their communities, assisting in raising awareness and building latrines.

Another supporting activity is the construction of public latrines with handwashing facilities in large market centres so that families that have been “triggered” have access to sanitation facilities in public places. Public latrines should be constructed by local authorities. In general, the management models that have proven most sustainable involve some form of private sector management that is paid to maintain the infrastructure. This includes operation contracted out to NGOs, small contractors or user groups through, for example, a lease contract. The operator’s incentive to maintain a clean facility in good working order comes

[35] Kar, K. and Chambers, R (2008). *Handbook on Community-Led Total Sanitation*. Prepared with the Support of Plan International (UK). March 2008.

from the continued desire of the public to use the latrine and pay for the service. A small user fee is levied on customers, which needs to be sufficient to cover O&M costs and ensure a reasonable income for the manager. In some cases where cost recovery is not possible, the municipality may need to subsidise operation through other sources of income (e.g. taxes). Sustainable management models for public latrines will be developed and tested within the programme.

Currently, handwashing and hygiene are dealt with in an ad-hoc manner within the STLC programme in Angola. These need to be addressed in a more robust manner within the programme. Specific triggering tools exist, as outlined by UNICEF Malawi[36], that can be used as part of STLC to achieve improved handwashing behaviour. Communities are facilitated to conduct activities that will instil a realisation of the importance of handwashing with soap to decrease contamination and illness. These tools can be used in combination with other triggering tools during the STLC mobilisation process. The tools, outlined in the Operations Manual, include activities such as a demonstration of anal cleansing materials and methods resulting in the transfer of fecal matter to the hands; an enactment of shaking hands after using the latrine without handwashing to illustrate how fecal matter can be passed from person to person; and a demonstration using charcoal on hands to show how using soap improves the removal of the dirt over washing hands with only water.

The lessons learnt in Angola and in other countries using STLC such as Ethiopia, Mozambique and Ghana point to the long-term need for continuing monitoring of ODF communities. This is to ensure that they stay ODF and move up the sanitation ladder to reach 100% sanitation as defined by JMP and the MDGs.

### 5.6.2 Sanitation marketing

Once demand for latrines is created through STLC, it needs to be met through locally available products and services. Sanitation marketing needs to be implemented in support of the STLC process to improve service delivery, expand sanitation options for the poor and continue to motivate sanitation and hygiene behaviour change in the long-term. Sanitation marketing uses behaviour change communication with social and commercial marketing practices to increase both demand and supply for improved sanitation[37]. In the rural context, sanitation marketing involves mason training (which is already part of the Huila programme), choice of latrine designs and service levels, standardisation of latrine designs, micro-enterprise loans or subsidies where appropriate (e.g. revolving funds or renting slab molds to masons), and municipal demonstration centres or demonstration latrines in communities distant from the municipal capital, for product marketing.

Sanitation marketing can be challenging in a rural context, particularly in disperse areas. However, the techniques have been used successfully in rural areas in several African countries, including Benin and Tanzania. In Benin, for example, the social marketing communications campaign utilised mass media (radio and billboards) and direct consumer contact activities (games, competitions, give-aways) to disseminate consumer-focused motivational messages based upon non-health benefits of latrines reflecting rural communities' own perceptions of the usefulness and value of latrines[38]. A network of local masons was trained to build a variety of low-cost latrine models. Training in basic marketing and sales techniques allowed masons to effectively find their own new customers and market their services. Importantly, links were created between demand and supply as part of the marketing messages. The supply chain for construction materials in Benin was identified

[36] Maulit, J.A. (2014). 'How to Trigger for Handwashing with Soap', *Frontiers of STLC: Innovations and Insights* Issue 2, Brighton: IDS.
[37] Perez, E. et al. (2012). *What Does it Take to Scale Up Rural Sanitation?* WSP, July 2012.
[38] WSP (2011). *Experiences from Rural Benin: Sanitation Marketing at Scale*. Field Note, April 2011.

as a weakness, making latrine construction relatively expensive in rural areas due to the cost of transportation. This is likely to be an issue in Angola and measures to address this should be investigated, such as through the recommended participatory design of low-cost latrines using locally available materials.

Thus far in Angola sanitation marketing has been limited to latrine mason training. Latrine masons are a key element in the supply chain, but are often limited in their ability to provide services to communities. Constraints to masons' success should be investigated and mitigation measures put in place under the NRWSSP to improve service provision.

Appropriate latrine designs to meet the MDG criteria for sanitation at low cost should be developed within the NRWSSP. This can be conducted through a participatory design process which enables users to create, identify and select appropriate sanitation technologies, as described in Section 4.2.2. Once new designs have been agreed on and prototyped successfully, the sanitation masons would be trained in their promotion and construction.

# 6 SAMPLE PROJECTS

## 6.1 Project selection

Sample projects were developed during the design of the NRWSSP to test the project planning cycle and develop typical conceptual-level designs that are representative of conditions across the country. The sample projects were selected from among the three provinces that will participate in Phase 1 of the NRWSSP: Uige, Huambo and Lunda Sul, and include a range of community sizes, from rural dispersed populations to more concentrated populations, as well as a range of technologies and service levels. Communities were chosen in consultation with the provincial and municipal governments during a participatory workshop in each province.

Selection criteria similar to those to be applied under the NRWSSP were used as the selection criteria for the sample projects, subject to limitations of accessibility and timeframe. These included the following criteria:

- *Community expression of interest:* The NRWSSP will follow a demand-responsive approach to identify communities that are likely to maintain their water and sanitation services over time. With this approach, communities must express informed demand for improved services explicitly, either through a written or oral request to municipal or *comuna* authorities. The request should be accompanied by the following proofs of interest: (i) a list of households in the community with associated data; and (ii) a map of the community showing the locations of households, community infrastructure (e.g. roads, schools, health centres, etc.), existing water and sanitation infrastructure, and potential water sources.
- *Population range:* Sample projects were chosen to adequately represent the following population ranges to the extent possible:
  - 150 - 250 (disperse);
  - 500 - 1000 (semi-disperse); and
  - 1500 - 2000 (concentrated).
- *Technical feasibility:* Sample project sites must present conditions which are technically feasible, as determined during a site visit.
- *Varying sanitation conditions:* Sample projects were selected to represent different sanitation conditions (primarily the existence and condition of latrines) varying from poor to relatively good.
- *Accessibility:* Sample project sites were selected within one hour from the provincial capital.
- *Municipal, provincial and national approval:* Sample project sites must be agreed to by municipal, provincial and national levels of government.

Additional prioritisation criteria may need to be applied in the NRWSSP to select among those projects where communities have expressed demand. Table 6.1 lists the selection and prioritisation criteria, which serve as flexible guidelines that may need to be adapted to unique local circumstances.

**Table 6.1: NRWSSP project prioritisation criteria**

| CRITERIA | PRIORITISATION | APPLICABILITY |
|---|---|---|
| Project characterisation | 1. Never served community<br>2. Underserved community<br>3. Existing water and/or sanitation service that requires major rehabilitation | Phase 1, 2, and 3 |
| Service to be provided | 1. Both water and sanitation<br>2. Either water supply or sanitation<br>3. Capacity building, research activity, source water protection, or other | Phase 1, 2, and 3 |
| Project community poverty level | 1. Highest quartile poverty ranking<br>2. Second quartile<br>3. Third or fourth quartile | Phase 1, 2, and 3 |
| Estimated per person construction cost (water supply and/or sanitation) | 1. Lowest quartile<br>2. Second lowest quartile<br>3. Third or fourth quartile | Phase 1, 2, and 3 |
| Estimated per person O&M costs (water supply) | 1. Lowest quartile<br>2. Second lowest quartile<br>3. Third or fourth quartile | Phase 1, 2, and 3 |
| Province (Municipality / *Comuna*) relatively underserved | 1. Lowest quartile<br>2. Second lowest quartile<br>3. Third or fourth quartile | Phase 1 and 2 |
| Provincial water system functionality rate | 1. Highest quartile<br>2. Second highest quartile<br>3. Third or fourth highest quartile | Phase 2 and 3 |
| Municipality water system functionality rate | 1. Highest quartile<br>2. Second highest quartile<br>3. Third or fourth highest quartile | Phase 2 and 3 |
| Geographic proximity | 1. Numerous prioritised communities located in close proximity<br>2. Several prioritised communities nearby<br>3. No prioritised communities in close proximity | Phase 1 and 2 |
| Impact on environment | 1. Minimum negative impact and positive impact on environmental hygiene<br>2. Mixed environmental impact<br>3. Negative environmental impact. | Phase 1, 2, and 3 |

## 6.2 Provincial workshops

A planning workshop was held in each of the three provinces to develop the projects with local stakeholders. This being a theoretical exercise, care was taken to ensure that expectations of the communities and stakeholders were not raised. The objective of the workshops was to discuss the selection criteria and the communities to be selected. Participants included stakeholders from various levels, including DPEA and municipal administrations.

During the workshops, short-lists of communities for each province were developed by stakeholders using the selection criteria discussed above. Potential technical options were then identified for each. From these, communities were selected with DNA, DPEA and the municipalities for the sample designs. A work plan for completing the rapid field assessments was also developed with stakeholders, including a discussion of the field survey logistics.

## 6.3 Communities selected

The communities selected for the sample project designs are listed in Table 6.2. These rural communities have populations ranging from about 400 to 2,700 inhabitants, and include both disperse and concentrated communities.

**Table 6.2: Selected communities**

| PROVINCE | MUNICIPALITY | COMMUNE | VILLAGE | POPULATION |
|---|---|---|---|---|
| Huambo | Cachiungo | Chiumbo | Calunda | 2,650 |
| | Cachiungo | Chinhama | Savitangayala | 1,300 |
| Uige | Quitexe | Sede | Kinhinga | 1,800 |
| | Quitexe | Cambambe | Mufuke | 1,030 |
| Lunda Sul | Kacolo | Kacolo | Matxisengue | 1,500 |
| | Muconda | Muriege | Txitende | 380 |

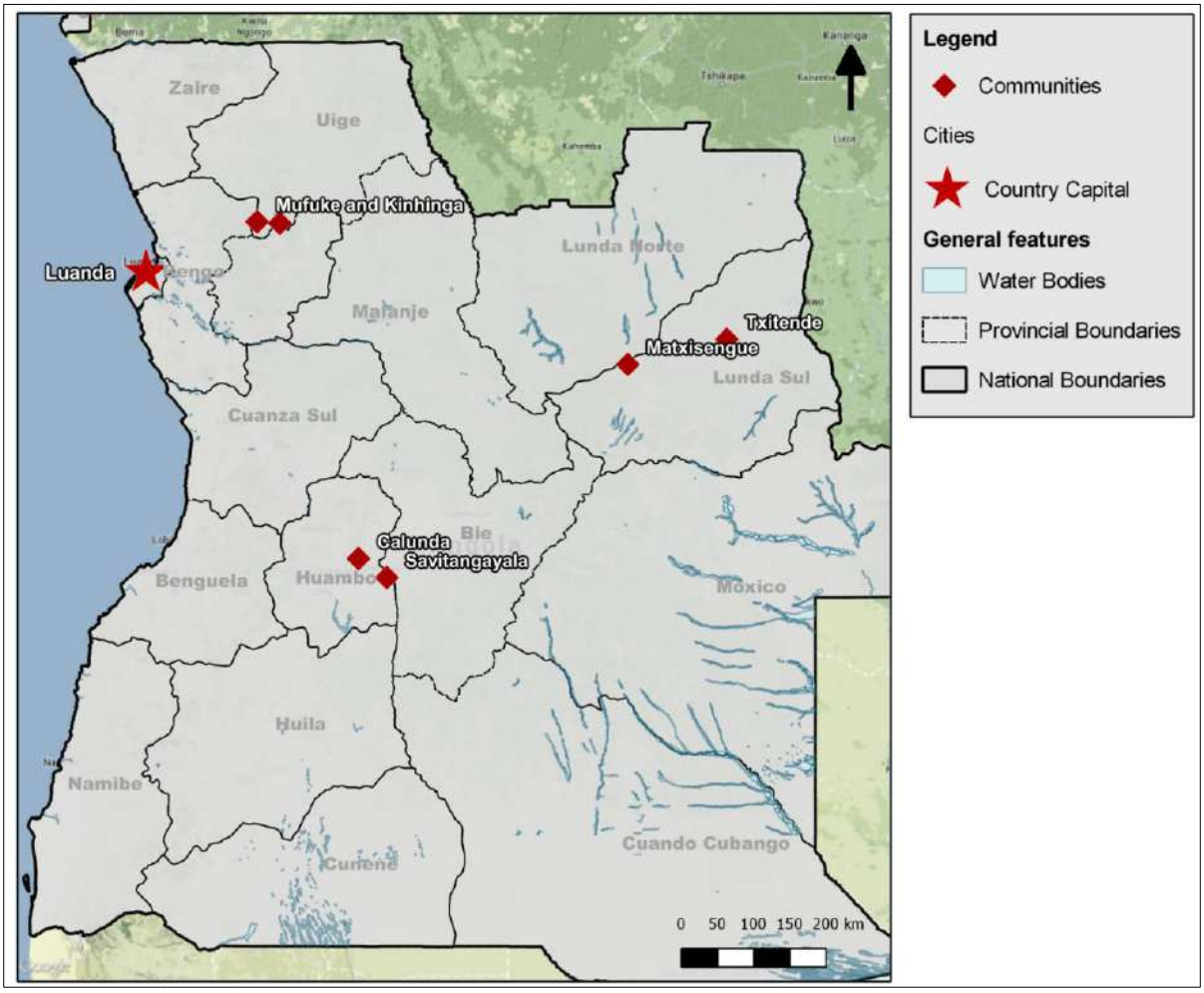
A map of the communities is shown in Figure 6.1.

## 6.4 Field surveys

A field visit was conducted to each selected community to meet with local leaders and community members, facilitate participatory consultations and focus group discussions, collect information on the existing water supply and sanitation situation, and conduct socio-economic household surveys. The survey included a high-level demand assessment, demographic typographies, assessment of appropriate technological options, willingness-to-pay thresholds and a rapid baseline (actual water and sanitation access, status of O&M, etc.). The information necessary to plan and design the sample projects was collected and analysed. Detailed analysis of the field data is provided in Annex A.

Generally, the communities are located in areas with a mix of dense vegetation and clear land, with many small streams and springs that could be used for water supply. The availability of these sources indicates that groundwater would also be a good alternative. The populations in the communities have minimal access to improved water supply, with water being collected from streams, unprotected springs and hand dug wells. Community members indicated that some of these sources dry up during the dry season, leading to problems of water scarcity. In some communities improved water supply infrastructure had been constructed but was no longer functioning, or construction had never been completed. In one of the six communities, the population has access to a borehole equipped with a hand pump. The majority of people (80% or more) do not use any form of treatment in the home before drinking their water.

**Figure 6.1: Location of selected communities**




In the study area the main forms of sanitation include latrines, open defecation, toilets connected to a septic tank, latrines without slab, and pour-flush latrines. Sanitation coverage in the communities ranges from 1% to over 90%, with coverage in four of the six communities above 70%. The highest coverage, of 90%, is due to a recent sanitation promotion programme in that community. In the two communities with the lowest coverage, rates are 1% and 20% respectively. A portion of each community practices open defecation. Diarrheal disease and malaria are prevalent in all communities. This problem is exacerbated during the rainy season when water quality at the unimproved sources deteriorates due to surface runoff, increasing the incidence of illness.

Gender continues to be an important issue with respect to water and sanitation. Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. In all communities, 100% of the households surveyed claim that fetching water is a female responsibility.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could be used for other economic or household activities. As distance travelled to the water source increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. People in the communities walk 0.5 km to over 2.5 km twice per day to collect water.

Willingness to pay was also investigated through the field surveys. In all communities, households are willing to pay for water, at rates ranging from USD 0.17 to USD 1.12 per $m^3$.

The current official domestic tariff is USD 0.40 per $m^3$. However, many still have the perception that water is a right and it should not be priced.

A technical study was also conducted to collect data to assist with technology selection and conceptual design. The climate in the project areas is characterized by alternating rainy and dry seasons, with annual rainfall ranging from 800 mm to 1,500 mm per year. Average annual temperatures range from 18 to 25 Celsius degrees. The selected communities in Uige and Huambo are actually located in the area with the highest level of surface runoff (up to 400 – 600 mm/year), while the communities in the Province of Lunda Sul experience slightly less (up to 200 – 300 mm/year).

## 6.5 Technology and service level selection

In each community, the six technologies selected for the NRWSSP were considered to provide improved water services (refer to Section 4 for a detailed description of the technologies):

- Boreholes fitted with hand pumps;
- Gravity-fed piped distribution;
- Ram pump with piped distribution;
- Solar pump with piped distribution;
- Electromechanical pump with piped distribution; and
- Surface water with pump, treatment and piped distribution.

Selection of technical alternatives and service levels was based on consultations with the communities, the socio-economic constraints and criteria identified during the field assessment, as well as the technical constraints present in each community, including:

- Population size and dispersion;
- Water sources available (quantity & quality);
- Distance to the source;
- Elevation of the source in comparison with the community;
- Availability of electricity from the grid; and
- Operation and maintenance considerations.

The alternatives included in the conceptual design for each community were chosen based on the above but also to cover a range of technology options in the sample designs. In each case, other alternatives may be feasible. For example, boreholes equipped with hand pumps are likely a feasible option in each case, however have not been included in the alternatives designed for each community in order to include the greatest range of technologies in the sample projects as possible. In the case of surface water with a pump, treatment and piped distribution, no conceptual design was developed because this technology will only be used in specific situations where there is no alternative source of better quality and where it has been deemed by the government that cost is not a constraint. In each community in this study, other alternatives were available and more appropriate.

Piped supply provides a higher service level than boreholes equipped with hand pumps, however this is highly dependent on the yield of the water source. Additionally, piped supply can be significantly more expensive in both capital and O&M costs (depending on pumping method). It is important that the community be involved in the decision-making process as they will be responsible for operating and maintaining the infrastructure in the long term. Therefore the system needs to be suitable, sustainable and acceptable to community members. The community should also be involved in the siting of water points and tap

stands, as well as other components of the system, with technical assistance from a design engineer as needed.

## 6.6 Summary of sample project designs and costs

Conceptual designs have been developed and identification-level cost estimates prepared for water supply systems in the six selected communities. The designs are representative of a full range of conditions, water sources and service levels, with the exception of surface water (refer to Section 4 for more information). The designs have been prepared to a conceptual level based on the information collected during the rapid field assessments and technical study. The designs form the basis of standardised projects for planning purposes and have been used as standardised project modules in the preparation of the NRWSSP investment plan. Detailed information on each community and conceptual designs and cost estimates for the six sample projects is provided in Annex A.

Population projections and water demand were calculated for each community based on several assumptions and design guidelines, which are presented in the *Conceptual Design Report* (Annex A). The key assumptions included a regional population growth rate of 1.4% over a period of 20 years and a daily water consumption of 30L/person/day. Technical criteria were then selected, also presented in the report, to enable the design of the systems, including a pipe network if applicable. EPAnet was used to perform the hydraulic calculations on the water network and design the system components.

### 6.6.1 Calunda, Huambo Province

The community is very disperse, and there is no water supply infrastructure currently functioning in the area. The local health centre has a small electric pump installed next to a protected hand dug well, with electricity supplied from the diesel generator used by the center. The water is pumped to a tank located approximately 150 m from the well. Four springs that could be used for a water system were identified in the area, as well as a river and several hand dug wells. The estimated yields at the four springs are between 0.10 and 0.25 L/s. They could be sufficient for a number of families but not as the main supply for the community even if combined. Two options are proposed for Calunda, based on the water sources available and the dispersion of the community:

- *Option 1 – Borehole with an electromechanical pump and gravity distribution*: The first option involves the drilling of one or many positive boreholes in the area and in close proximity to the village, pumping to a reservoir using an electromechanical pump, and a gravity distribution system. This is subject to availability of electricity from the grid. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 12km, varying in diameter from 50 to 90 mm. Based on 16 hours per day of pumping at a steady flow and the expected water demand pattern a design volume of 60 $m^3$ is recommended for the main reservoir, to be located on a relative high point in the community to provide enough pressure in the distribution system.
- *Option 2 – Boreholes equipped with hand pumps*: The second option for the community would be to drill approximately fourteen positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. Suggested locations for the fourteen water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. Results from further field investigations will be used to determine the final locations, depending on further consultations as well as local hydro-geological and soil conditions.

### 6.6.2 Savitangayala, Huambo Province

The community is quite disperse. There is one improved spring catchment which consists of a small concrete box with three outlets and a drain pipe. Two of the original three outlets are broken and were plugged, and users also block the drainage to use the box as a washing basin. Early estimates indicate that the yield of this specific spring would not be sufficient to be used as the main supply for a community system. A hand pump was also installed to serve both the school and the health center. The presence of these springs and wells in the community indicate that the groundwater table is fairly high in the area. Without any springs as potential sources for the community, the following two options are proposed for Savitangayala:

- *Option 1 – Solar pump and gravity distribution:* The first option involves the drilling of one or several positive boreholes in the area and in close proximity to the village, pumping to a reservoir using a solar powered pump, and a gravity distribution system. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 3.8 km, varying in diameter from 50 to 90 mm. The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow. Based on this and the expected demand a design volume of 42 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.
- *Option 2 – Boreholes equipped with hand pumps*: The second option for the community would be to drill approximately seven positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

### 6.6.3 Matxisengue, Lunda Sul Province

There is currently no water supply infrastructure functioning in the area surrounding Matxisengue. A contractor started installing a solar water supply system in 2008 but never completed the works. The system source was the spring located to the north of the community, however it seems that the spring was chosen based on its immediate accessibility rather than the available yield and water quality. Three public standpipes have been constructed but they are not connected to any system. A local NGO also installed a hand pump in the community a few years ago, but a breakdown occurred after six months and the pump was never repaired. There are two key springs in the surroundings of the community. Estimates indicate that the flow of one of the springs, of approximately 2.5 L/s, is good, however the elevation of the spring is not conducive to a gravity-fed system. The flow rate of the second spring is insufficient to meet demand. Therefore the following two options are proposed for Matxisengue:

- *Option 1 – Solar pump with gravity distribution*: The first option involves the capping of a spring, pumping using a solar powered pump to an elevated reservoir, and a gravity distribution system. This scenario is conditional on further checks of the spring yield available. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 2.7 km, varying in diameter from 50 to 90 mm. The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow. Based on this and the expected demand a design volume of 40 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.
- *Option 2 – Borehole with an electromechanical pump and gravity distribution*: The second option involves the drilling of a positive borehole in the area and in close proximity to the

village, pumping to a reservoir using an electromechanical pump, and a gravity distribution system. This is subject to availability of electricity from the grid. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 2.3 km, varying in diameter from 50 to 90 mm. The pump delivers water to the main reservoir during an estimated 16 hours per day at a steady flow. Based on this and the expected demand a design volume of 34 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

### 6.6.4 Txitende, Lunda Sul Province

There is currently no functioning water supply infrastructure in the Txitende area, but there have been various interventions in the community in the past. A hand dug well was started but never completed. Two boreholes were also constructed in different periods, but these are currently non-functional due to a lack of maintenance and problems related to sandy soils. New boreholes have recently been drilled and two standpipes constructed, however the boreholes are sealed and the contractor never finished the works. There are two main unimproved water sources in the surrounding area of Txitende: a river and a spring. The water quality in the river can be quite low. The spring is located approximately 1 km from the community and is covered by a thick layer of organic matter. Given this information and the small population of the community, only one option is proposed for Txitende:

- *Option 1 – Boreholes equipped with hand pumps*: The option for the community would be to drill approximately two positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. Special considerations would be needed for borehole siting and location because of the sandy soil conditions observed. Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

### 6.6.5 Kinhinga, Uige Province

The system for Kinhinga will also serve a small sister village approximately 1 km away. There is currently no existing water supply infrastructure in the area surrounding the villages. Three springs that could be used for a water system were identified in the area. The first is located in close proximity to the main village, however estimates indicate that the flow is not sufficient to meet demand. The second, also in close proximity, has a total flow of 0.83 L/s, which could potentially meet the demand from the community depending on the level of service provided. The third spring is contaminated with refuse and likely bacteria from open defecation upstream. Based on this information, the following two options are proposed for Kinhinga:

- *Option 1 – Boreholes equipped with hand pumps:* The first option for the community would be to drill approximately ten positive boreholes, eight in the main community and two in the sister village. The boreholes would be fitted with hand pumps. Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.
- *Option 2 – Ram pump with distribution network:* Most of the houses are located at a higher elevation than the spring. Therefore, the second option involves the capping of a spring, pumping using a hydraulic ram pump and a gravity distribution system. This scenario is conditional on further checks of the spring yield. The pipe sizing was done at a

conceptual level, resulting in a total pipe length of approximately 3.5 km, varying in diameter from 50 to 72 mm. The ram pump delivers water to the main reservoir during an estimated 24 hours per day at a steady flow. Based on this and the expected demand a design volume of 40 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

### 6.6.6 Mufuke, Uige Province

There is currently no existing water supply infrastructure in the area surrounding Mufuke. Two main springs that could be used for a water system were identified in the area. The first is located in close proximity to the community however estimates indicate that the flow rate is too low to meet demand. The second, located further from the community, has an estimated flow rate of 0.83 L/s, which could potentially meet demand depending on the service level provided. Based on this, the following two options are proposed for Mufuke:

- *Option 1 – Ram pump with gravity distribution*: Most of the houses are located at a higher elevation than the spring. Therefore, the first option involves the capping of a spring, pumping using a hydraulic ram pump and a gravity distribution system. This scenario is conditional on further checks of the spring yield available. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 3.2 km, varying in diameter from 50 to 72 mm. The ram pump delivers water to the main reservoir during an estimated 24 hours per day at a steady flow. Based on this and the expected demand a design volume of 26 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.
- *Option 2 – Solar pump with gravity distribution:* The second option involves the drilling of a positive borehole in the area and in close proximity to the village, pumping to a reservoir using a submersible pump powered by solar panels, and a gravity distribution system. The pipe sizing was done at a conceptual level, resulting in a total pipe length of approximately 2.1 km, varying in diameter from 50 to 72 mm. The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow. Based on this and the expected demand a design volume of 36 $m^3$ is recommended for the main reservoir. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

### 6.6.7 Cost estimates for sample projects

The investment and O&M costs for each of the design options in each community are included in Table 6.3. The costs are based on the design population and the unit costs calculated for the specific type of system. A description of how the unit costs were developed is included in Section 4. The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction, and 70% of the necessary capital maintenance (asset renewal, replacement and rehabilitation) to ensure long-term sustainability; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of capital maintenance costs.

**Table 6.3: Capital investment and O&M costs for sample projects (USD)**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| **Calunda** | | | | | | |
| 1) Borehole / electromech. pump / piped dist. | 1 | 3,499 | 150.15 | 525,400 | 7.90 | 27,600 |
| 2) Borehole / Handpump | 14 | 3,499 | 68.45 | 3,353,100 | 1.78 | 87,200 |
| **Savitangayala** | | | | | | |
| 1) Borehole / solar pump / piped dist. | 1 | 1,717 | 153.65 | 263,800 | 5.11 | 8,800 |
| 2) Borehole / Handpump | 7 | 1,717 | 68.45 | 822,700 | 1.78 | 21,400 |
| **Matxisengue** | | | | | | |
| 1) Borehole / solar pump / piped dist. | 1 | 1,981 | 153.65 | 304,400 | 5.11 | 10,100 |
| 2) Borehole / electromech. pump / piped dist. | 1 | 1,981 | 150.15 | 297,400 | 7.90 | 15,600 |
| **Txitende** | | | | | | |
| 1) Borehole / Handpump | 2 | 502 | 68.45 | 68,700 | 1.78 | 1,800 |
| **Kinhinga** | | | | | | |
| 1) Borehole / Handpump | 10 | 2,377 | 68.45 | 1,627,100 | 1.78 | 42,300 |
| 2) Spring / ram pump / piped dist. | 1 | 2,377 | 123.18 | 292,800 | 2.23 | 5,300 |
| **Mufuke** | | | | | | |
| 1) Spring / ram pump / piped dist. | 1 | 1,505 | 123.18 | 185,400 | 2.23 | 3,400 |
| 2) Borehole / solar pump / piped dist. | 1 | 1,505 | 153.65 | 231,200 | 5.11 | 7,700 |

# 7 MONITORING AND REPORTING

## 7.1 Monitoring and reporting under the NRWSSP

Monitoring and reporting (M&R) under the NRWSSP encompasses the following:

- Overall sector monitoring for improved sector management;
- Monitoring for system maintenance and repair to improve sustainability of the infrastructure; and
- Monitoring of the NRWSSP itself and the ability of stakeholders to implement the programme.

The first two components and how they will be addressed under the NRWSSP are included in the sections that follow, Section 7.2 and 7.3 respectively. These are components of the programme which will be implemented through a series of associated activities over the course of the NRWSSP. The implementation of these two components is further described in the NRWSSP Operations Manual.

Monitoring of the NRWSSP itself and of the ability of stakeholders to implement the programme such that results are achieved is part of the management of the programme. It is addressed briefly in Section 7.4 and in detail in the Operations Manual.

## 7.2 Monitoring and reporting for sector management

### 7.2.1 Background

MINEA/DNA has developed a water sector database, known as SISAS, with support from UNICEF and the EU, which is the country's primary information management tool for the water supply sector. The platform recently underwent a review and re-development process. Procedures for data collection and reporting are irregular and inter-agency coordination needs improvement. Use of the data that is collected is limited and sector management suffers as a result. The lack of capacity at the provincial and municipal levels to collect and manage information on service delivery presents a significant challenge to sector monitoring. Another challenge for Angola is the lack of reliable population data. These deficiencies handicap the sector's ability to develop realistic targets, plans and budgets or even to measure performance.

However, this situation is improving. In May 2014 the GoA conducted its first national census since 1975, which should result in significantly more accurate population and related data than currently exists. The census also collected data regarding water sources, household water treatment and sanitation facilities. As is typical of such censuses the data will likely not be available for at least 12 months. In addition, the 2012 Integrated Survey on Household Well-Being (IBEP), carried out by the National Statistical Institute (INE), produced population estimates as well as some basic estimates for water and sanitation access. Similarly, the Water for All Programme (PAT), which began in 2007, has included monitoring which generated some data related to populations served, per-capita costs and system functionality. Nonetheless, huge information gaps remain, especially on sanitation and hygiene, sector finances, water resources, water quality and information leading to insights on sustainable service provision such as tariffs, and functioning of community organisations.

### 7.2.2 SISAS

SISAS was designed to assist sector decision-makers in policy development, planning, and resource allocation. Its stated objectives are to:

- determine the current state of water and sanitation services and report results to sector stakeholders, underscoring the challenges to meet the need for improved access;
- facilitate planning, the formulation of policies, rules, and strategies, and to follow-up on sector progress and the impact of investments; and,
- provide a unified and official sector information management system that supplies, reliable, up to date, and timely information.

These objectives meet the needs of a sector monitoring system, however SISAS has not yet met these objectives. The SISAS database has been populated with data, collected between 2008 and 2012, on all formal water systems across the country, as well as selected data on water and sanitation services in most schools and health centres. A centrally directed national survey was conducted to collect this information. Data was collected in the field by trained enumerators, uploaded into the provincial level of the SISAS system and subsequently into the central SISAS system.

SISAS has provided a much greater understanding of the sector's status than ever before. However, time-sensitive information, such as (1) system break down or functionality and (2) access from new systems, is not being collected and SISAS is not being updated. It currently provides a static snapshot of the sector and is not being used as a dynamic management tool.

One of the most significant issues impacting the effectiveness of SISAS as a decision-making, planning and management tool is the reliability of its data. Although field data collection for SISAS included information on the number of homes and population in each locality visited, these figures were not collected consistently and are not currently being used by SISAS. Instead, SISAS presents water and sanitation coverage based on the 2008/2009 population figures from INE/IBEP. These population figures are likely to be low, and would result in an overestimation of water and sanitation coverage levels. For planning purposes, the most reliable *comuna*-level population data are preferred. The use of the 2008/2009 population figures from INE/IBEP for this purpose is not ideal or recommended, given: (1) that it is out-of-date; (2) the high rural-to-urban migration in Angola; and (3) the comparatively higher, more recent population estimates from both GoA and other sources. The uncertainty with regards to population represents a significant problem for meaningful analysis using SISAS, however this may be addressed through the use of the new census data collected in May 2014.

Surveys that estimate access through brief visits to rural communities are subject to significant error, especially in dispersed localities. A review of water system records in the SISAS database, and discussions with SISAS technicians indicate that, in many cases, the number stated as having access is the total number of inhabitants using the water source, irrespective of distance to or number of users. DNA's criteria for improved access in rural areas provides for a maximum distance of 100 metres from the tap or pump to the household (Sector Bulletin, 2012) (Rascunho, 2012). The PDSA (2004) sets this at 200 metres. The PDSA sets the maximum number of users per rural water point at 300. SISAS access estimates are likely to be higher than reality given that (1) they include users that do not meet standard criteria for access and, (2) total populations are likely to be over-estimated. Such over-estimates result in the surveyed population remaining under-served as investment planners and decision makers would naturally consider them to already have adequate access.

### 7.2.3 Current status of water and sanitation sector monitoring

SISAS is managed by DNA. Provincial level systems exist (although are not 100% functional), and the database specialists remaining in each province are funded by DNA. However, institutional coordination regarding data collection is fractured and there is a lack

of coordination between stakeholders for planning and M&R. No agreement or procedures exist between the centre and the provinces/municipalities for regular monitoring and reporting on an on-going basis to update SISAS, to fill in data gaps, or validate questionable data. DNA hopes to initiate another round of data collection, and has appealed to the provinces to allocate the required resources, but few provinces are interested in allocating time or resources for this purpose. Under the NRWSSP, a holistic sector monitoring system will be developed with an emphasis on regular funding allocations for M&R.

Far more is needed of SISAS if the information is to be effectively used for sector planning and management at the levels of government that need it most. The fact that SISAS has a provincial-level system means that it has potential for becoming a valuable tool at that level. Under the right conditions, the system could be used by municipalities as well, although many currently do not have the skills or equipment to be able to do so.

The design, implementation, management and use of an effective sector monitoring system are complex and must actively involve all levels of government. Information needs to be collected by those that also use it, meaning that the lower levels of government should collect the information for transfer upwards but also have access to it for use in managing its water supply systems locally. It needs consistent budget support to be sustainable. It needs to be demand (not supply) driven, meaning that the users should value and demand the information. The mere existence (or supply) of information does not mean that stakeholders will use it.

The sector monitoring framework in Angola needs to be refined, strengthened, regularly updated, made cost effective and respond to the needs of all levels of government from *comunas* and communities to DNA at the centre. It needs to be streamlined by concentrating on the smallest number of relevant indicators that can be measured regularly with an acceptable level of effort by those already in the field and responsible for the systems they are monitoring. It needs to institutionalise demand for the data through sector reviews and integration of the data into planning and resource allocation processes.

### 7.2.4 Objectives of monitoring for sector management

Effective sector monitoring enables progress measurement, informed management, transparent planning and budget allocations, comparisons between municipalities and provinces, and assessment of target achievement (e.g. the MDGs). SISAS is a first step, on which a sector monitoring and information system can be based; however it is only one component of what should be a much broader system. The specific objectives for monitoring and reporting for sector management in the rural water, sanitation and hygiene sub-sector are to:

- Inform transparent planning, resource allocation and sector management;
- Monitor access to water and sanitation throughout the country;
- Monitor progress towards the MDGs and other national targets and indicators; and
- Facilitate needs assessment and the equitable distribution of resources and effort.

The NRWSSP sub-sector monitoring and reporting system is designed to:

- Collect and analyse relevant data starting at community level and rolling up to the national level;
- Regularly update information using simple indicators and regular data collection (information which is relevant, reliable, up to date, and timely);
- Institutionalise the use of the data in planning, management and budgeting so that the system becomes demand driven;
- Enable benchmarking and performance measurement;

- Allow assessment of progress towards specific targets; and
- Become sustained by reliable budgetary support.

### 7.2.5 Organisational framework, roles & responsibilities

The sector monitoring and reporting system must be developed within the existing institutional framework and respond to the needs of stakeholders. It should be developed around SISAS, building on its strengths and addressing some of its weaknesses. The intention is not to 're-invent the wheel' but to improve on the existing framework, its infrastructure, processes and systems to institutionalise the collection, analysis and use of data in planning, management, and resource allocation.

The NRWSSP presents a good opportunity to continue the process already started with SISAS to develop a monitoring and reporting system for the rural water, sanitation and hygiene sub-sector. It is recognised that the DNA-TA has proposed an M&R structure for rural water, a set of indicators to monitor the sector and a database for rural water. The system developed for implementation under the NRWSSP aims to align these with the experiences of other countries in developing comprehensive sector monitoring systems, not to develop a parallel system destined to fall into disuse once the programme has ended. Based on the recommendations made here, DNA will need to work towards one holistic but simple system that becomes institutionalised at all levels and is sustainable over the long term.

Strengthening of the monitoring framework will be required, which should include:

- Benchmarking using national indicators to enable comparisons between provinces and municipalities, and potentially service providers, which would feed into planning and budget allocation;
- Harmonization of surveys (SISAS, national census, MICS, IBEP/INE, DNEP/DPE/MINPLAN) to streamline data collection and ensure different stakeholders are collecting data using the same indicators and definitions;
- Financial monitoring to track financial flows, results based on financing decisions, and progress towards cost recovery;
- A sector-wide policy dialogue to develop a monitoring and reporting strategy and an action plan for rolling out a monitoring system in the sector, including a sector review process;
- An annual rolling plan, based on municipal and provincial-level planning that is then rolled up to the centre and updated at least annually;
- Sub-sector performance reports based on information collected during regular monitoring and data collection activities which can then be presented during an annual sector review exercise; and,
- Regular funding allocations for M&R activities from the centre to provinces and municipalities to ensure all stakeholders are able to adequately carry out their M&R responsibilities.

The importance of stakeholder motivation cannot be understated. If stakeholders are not motivated and the system not demand-driven it will fail, just as it has so many times in so many countries. Experience has demonstrated that the most practical way in which monitoring can be motivated is by: (1) making it central to the sector review and resource allocation process, and (2) ensuring that it is useful and demanded by all stakeholders.

As the entity responsible for the provision and maintenance of water and sanitation services, the municipality should be the focus for the development of the monitoring system. The municipality will be responsible for managing data collection, with information being provided

by each community. Data will be collected annually from each GAS for a set of key indicators that are simple, sensitive, relevant, and verifiable. Data collected at this level would be aggregated as it passes up through the different levels of government through systematised reporting. Many municipalities do not have the capacity to manage a computer-based database system, therefore paper records will still be required in many cases.

The province will be responsible for overseeing the data collection and management process, including data validation and reporting to the centre. It will ensure timely reporting from municipalities and will provide technical assistance and capacity building to municipalities as required. Each province has a computerised SISAS system, although most will require rehabilitation and updating. Data can be entered into SISAS at the provincial level, which will feed the central SISAS database. The province will use the data in planning and management decisions in a transparent manner through processes developed under the NRWSSP.

At the central level, DNA will remain responsible for SISAS, which should be upgraded and improved (population data used within the database needs to be refined using up-to-date census data when it becomes available; systems should be geo-referenced and a water point mapping function added). The information should roll up and be used to measure progress on a specific set of indicators. The monitoring framework needs to be strengthened and DNA should lead this process, but it must include key stakeholders (provinces, municipalities, *comunas* and community organisations) involved in data collection, dissemination and use to achieve ownership of the system to ensure sustainability. At the central level, discussions should be conducted regarding how best to integrate the information into the planning and budgeting processes, while developing procedures for an annual sector review and annual sector report. A strong sector-wide multi-stakeholder working group is needed to provide coordination, quality assurance and drive the annual sector performance assessment and sector review. Funding needs to be provided for M&R activities and should become a part of the regular budgeting process.

Regarding sanitation, MINAMB is the ministry responsible but does not have a database to monitor the sub-sector. As M&R moves forward, MINAMB will need to work closely with DNA to coordinate the M&R relating to sanitation. It would be reasonable for MINAMB to be responsible for data collection and management through local government, and to be required to share the data collected with DNA and other stakeholders. The Demographic and Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS) both measure hygiene and sanitation indicators in their respective surveys. The role of surveys such as the DHS and MICS is critical to generating sanitation and hygiene data.

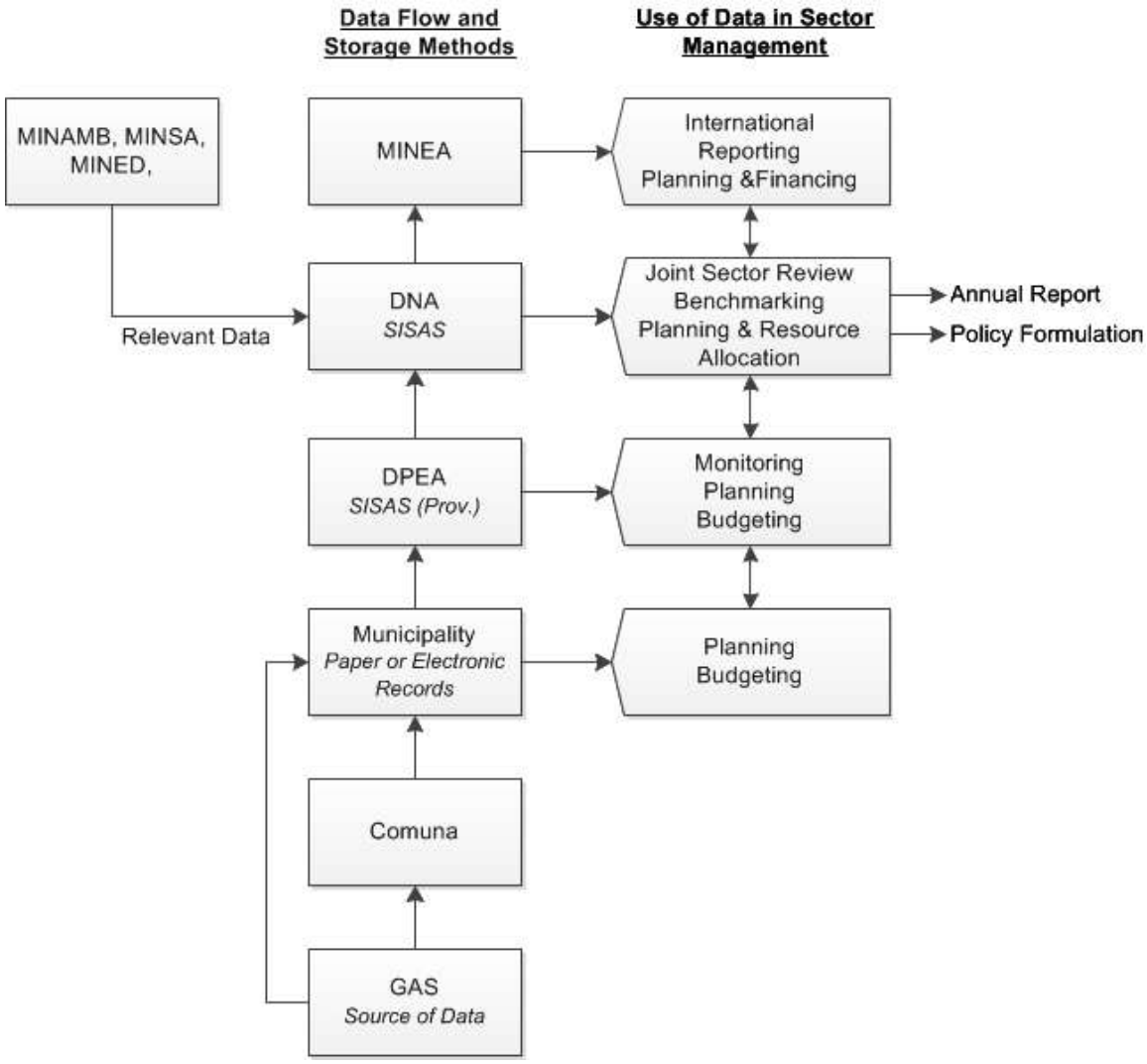
Table 7.1 summarises the roles and responsibilities of the various stakeholders in monitoring and reporting for sub-sector management.

**Table 7.1: Roles and responsibilities in monitoring and reporting on sub-sector management**

| STAKEHOLDER | ROLES & RESPONSIBILITIES |
|---|---|
| GAS | • Annually, provide data during field visits by municipal or *comuna* personnel for sector indicators |
| *Comunas* | • Assist with data collection from each GAS and submit data to the municipality. |
| Municipalities | • Manage and oversee data collection at local level.<br>• Review, assess, aggregate and store data.<br>• Establish and maintain municipal management information system.<br>• Use data in planning and management decisions in a transparent manner.<br>• Report to the province in the prescribed manner. |
| DPEA | • Provide assistance to municipalities; coordinate data collection.<br>• Review, assess, validate and aggregate data, enter data into provincial SISAS database.<br>• Use data in planning and funding decisions in a transparent manner.<br>• Report to DNA in the prescribed manner. |
| DNA | • Provide direction, technical assistance and capacity building to provinces.<br>• Provide funding for M&R to provinces & municipalities as part of regular budget.<br>• Upgrade SISAS with better census-based population data, geo-referencing and mapping, and maintain it long-term.<br>• Use data in planning, budgeting and policy development in a transparent manner.<br>• Coordinate annual reporting and sector review process through multi-stakeholder working group.<br>• Lead the strengthening of the monitoring framework.<br>• Coordinate with MINAMB for M&R related to rural sanitation, MINSA and MINED.<br>• Provide information to MINEA as required. |
| MINEA | • Respond to international reporting requirements.<br>• Support DNA and respond to planning and financial requirements in the sector. |
| MINAMB | • Collect sanitation related data through local government.<br>• Use data in planning, budgeting and policy development in a transparent manner.<br>• Share data with DNA. |
| MINSA | • Collect data related to communicable diseases, morbidity and mortality; hygiene and handwashing; health facility water and sanitation access, etc. as per existing mandate.<br>• Share data with DNA. |
| MINED | • Collect data on school water and sanitation services as per existing mandate.<br>• Share data with DNA. |
| Ministries of Finance and Planning | • Support MINEA to track expenditures for the planned annual review process.<br>• Support the planning and funding allocations process. |

Figure 7.1 presents the data collection, management and reporting system in graphic format, illustrating the flow of the data, how it will be stored and its ultimate use.

**Figure 7.1: Data flow diagram for rural water, sanitation & hygiene sub-sector monitoring**




### 7.2.6 Indicators for sector management

Each level of government has different needs and uses for data and information. At the national level, DNA is interested in access to services across the country, measuring progress on national indicators (e.g. JMP) and high level indicators that give a snapshot of the sector. DNA will also be interested in comparisons between provinces, enabling planning and budgeting decisions to be made. Additionally, DNA will have interest in nearly all the data collected to inform policy making and establish national standards and methodologies.

The municipality and lower levels have interest in nearly all kinds of information, which is to be expected as responsibility for provision of water and sanitation rests with the municipality and below. It will be heavily involved in planning and management, and is responsible for sustainability of the infrastructure. Municipalities need information for:

- monitoring the status and functionality of all systems under their jurisdiction;
- storage of all systems' physical and technical information;
- providing details for managing those responsible for repair and maintenance such as brigades, GAS and other responsible organisations and firms;
- scheduling and managing repair work;
- contract management and construction supervision; and

- providing information to their provincial database and SISAS at the centre.

The DNA TA has developed a set of indicators and a measurement framework for the rural water sector[39]. The document goes into a significant amount of detail regarding the indicators proposed, their measurement and scoring. The system is complex and although collecting the information would provide a significant amount of relevant data, this framework could result in the same situation that SISAS currently finds itself in: populated once, with too many indicators, and not updated. The indicators and data collection tools proposed would be very useful for occasional one-off evaluations of the sector, but the framework is too complex to be regularly used and institutionalised in planning and management. Although the framework consists of only 10 indicators, each has a series of sub-indicators, some of which are broken down among stakeholders, resulting in over 65 sub-indicators that need to be collected for each system and then given a rating score.

The recommended approach for the NRWSSP is to develop a practical sector monitoring system using few but meaningful indicators that respond to the needs of each level. For sector monitoring, planning and management, indicators are needed that can be reported on an annual basis by the municipalities through the provinces to the centre as part of the annual reporting and sector review process that will be established. Key indicators will enable the centre to plan and manage the sector and report to the Executive, relevant Ministries (especially MINEA), the Provinces and JMP. Eventually, once this process is institutionalised, policy development, planning and budgetary decisions will be dependent on this information.

Uganda has one of the most functional sector monitoring systems in Africa and is known for its effective sector management and development. Uganda uses “Ten Golden Indicators”, which are stored at the centre and reported on annually. In practice, only six of the ten indicators are used for central planning and management of the sector, including important indicators on cost and functionality which are essential for planning, budgeting and implementation. Based on these, but revised to reflect the Angolan context, the indicators proposed for sector monitoring, planning and management in Angola are listed in Table 7.2 along with the basic information that needs to be collected annually to report on the indicators and the source of that data. The indicators will need to be discussed at all levels and validated at the beginning of the NRWSSP to ensure each level of government will have access to the data it needs. A national glossary is recommended which defines clearly terms such as access, functionality, initial investment costs, etc.

The indicators proposed here are simple and require only basic data that is easily collected at the municipal level and below. This approach to sector monitoring is realistic and can be integrated into the current framework. The simplicity of the indicators will help to ensure that data is collected and used and that the system becomes sustainable rather than failing due to a higher than necessary level of complexity. Collection of more detailed information requires greater levels of effort, detailed household surveys and trained enumerators. This capacity simply does not exist at the municipal level at present. As the sector progresses, the information requirements can be adapted and each indicator could be monitored based on a limited number of sub-criteria to increase the level of detail and analysis possible. The indicators listed in Table 7.2 are more than adequate to meet the needs of stakeholders to manage the sector.

[39] DNA TA (2012). *MMA2: Indicadores de Referência de Prestação de Serviços – Sistemas Rurais e Peri-Urbanos*. December 2012.

**Table 7.2: Indicators & information requirements for planning and management of RWSS**

| INDICATOR | INFORMATION REQUIRED | DATA SOURCE |
|---|---|---|
| WATER | | |
| Access: % of people within 500m of improved water source[40] | Population within 500m of an improved source | Municipal records; confirmation by GAS |
| Functionality: % of schemes functioning at time of survey | Functionality of scheme (yes/no) at time of data collection | GAS |
| Quantity: minimum of 20L/cap/day of water available | Design capacity per capita | Construction records; functionality |
| SANITATION | | |
| Access: % of households with access to improved sanitation | No. of households with an improved latrine (MDG definition) | GAS |
| HYGIENE | | |
| Access: % of households with handwashing materials in dwelling/yard/plot (1) | No. of households with water and soap or other handwashing materials available (1) | Household survey & observation |
| GOVERNANCE | | |
| Investment: average capital cost per beneficiary for water supply infrastructure | Capital cost per beneficiary of systems constructed that year | Construction, procurement, and financial records |
| Equity: ratio of access of the lowest to the highest income quintile (1) | % of lowest wealth quintile households with access divided by the % of highest income quintile households with access (1) | Socio-economic survey |
| Management: % of schemes with actively functioning management (GAS or other) in place | Active management in place and functioning (yes/no) | Community |
| Gender: % of GAS (if community managed) with women holding decision-making positions | No. of women and men forming GAS. | GAS |

*1) Indicators would not be monitored by municipality annually for reasons described below.*

For most of these indicators the data can be collected quite easily from the GAS, community or municipal records. There are two indicators denoted Table 7.2 which require more complex data collection and analysis and as such will likely not be monitored regularly, at least at first. As a result, there are seven indicators on which data can be collected annually for use in sector management, planning and budgeting. The indicators which will not be monitored regularly are:

- Equity of access: The data required to monitor equity of access is likely unavailable in Angola at present, therefore monitoring of this indicator will not be possible until such a time that the data is easily accessible. It is, however, important to aim towards monitoring this indicator as it is a very important measure of sector planning and management, and the international post-MDG indicators are going to include measures of equity.
- Handwashing: Collecting the data required to monitor handwashing would require a household survey combined with observation for validation of the survey results. It is not practical for municipalities to conduct this type of data collection at this time, therefore this indicator can only be measured when data becomes available from future sector-wide evaluations. This indicator is the only indicator relating to hygiene practices, therefore the aim should be collect relevant data as and when possible. The Demographic and Health

[40] A maximum distance of up to 500m to an improved water source is the standard definition, internationally, of access in rural areas.

Survey (DHS) and Multiple Indicator Cluster Survey (MICS) both use this measure of hygiene in their respective surveys; data from these surveys could be used to monitor this indicator on an occasional basis.

### 7.2.7 Data collection & measurement for sector monitoring & management

In many countries data collection is often driven by periodic demands from politicians, the preparation of annual reports and *ad hoc* donor requests. Demand is seldom sufficient to ensure a consistent and reliable flow of information. As a result, such data that is collected is inconsistent in quality, regularity and geographic coverage. To date this has been the case in Angola, although the country is making progress with the development and implementation of SISAS. To be useable and sustainable, data collection must become a regularised process among all levels of government and collation, assessment and storage need to be integrated into the government's regular work and not depend on one-off surveys.

Data collection is far more organised and reliable where the demand from senior management is strong, rational and consistent and where the data collected is necessary in local government decision-making. In other words, there must be a demand for the data or stakeholders will not prioritise data collection. Additionally, monitoring is refined and deepened by enabling the beneficiaries to participate in data collection, systems monitoring and responding to information fed-back after analysis.

Data requirements in the sector go beyond the basic data required to measure progress against the indicators for planning and management. Specifically, two types of data should be collected:

- Dynamic Indicator Data: Basic data collected annually for reporting on the indicators for planning and management, as listed in Table 7.2; and
- Static System Data: Technical data on each system collected at the time of construction, for the purpose of maintaining records for reference as and when needed (refer to Section 7.2.9).

### 7.2.8 Data collection for monitoring & reporting on sector indicators

To avoid a large annual data collection exercise and integrate data collection into regular municipal activities, data collection will be conducted throughout the year. The municipality, working with the *comunas*, should be responsible for data collection. The incentive for this will come from the need to report on progress and performance to obtain funding through a sector review and planning process to be established by DNA. Within each municipality, one person should be made responsible as part of their job description for updates to the information system and coordinating data collection. Throughout the year and during the course of regular field visits to the extent possible, each community will be visited by a representative of the municipality or *comuna*. The municipal/*comuna* worker will have a short questionnaire (five simple questions) describing the data required (refer to Table 7.2) and will work with the GAS and local leaders to respond to the questions. On an annual basis, the municipality will aggregate the data and report to the province, which will then aggregate this data and report to DNA.

Data from other sources (INE, IBEP, MINAMB, etc.) should also be integrated into SISAS as and when it becomes available, such as the data recently collected through the national census. The census includes three questions of relevance to the sector, shown in Figure 7.2 (in addition to information on population) including the water source used by households, the treatment applied (if any), and the sanitation system used by households. Although there is limited detail, the information will be useful to update the percent coverage of water and sanitation for the whole country and should allow for mapping of systems by community to

assess equity of distribution. This will be very useful for updating the baseline already stored in SISAS.

**Figure 7.2: Water and sanitation questions from 2014 census questionnaire**

| F.04 QUE TIPO DE SANITÁRIO O AGREGADO NORMALMENTE UTILIZA? | | | |
|---|---|---|---|
| DENTRO DE CASA (Incluí o Perímetro do Quintal) | | | |
| SANITA LIGADA Á REDE PÚBLICA DE ESGOTOS | 01 ☐ | RETRETE/LATRINA LIGADA Á REDE PÚBLICA DE ESGOTOS | 04 ☐ |
| SANITA LIGADA Á FOSSA SÉPTICA | 02 ☐ | RETRETE/LATRINA LIGADA Á FOSSA SÉPTICA | 05 ☐ |
| SANITA LIGADA A FOSSA ABERTA (Vala ou Río) | 03 ☐ | RETRETE/LATRINA LIGADA Á FOSSA ABERTA (Vala ou Río) | 06 ☐ |
| FORA DE CASA | | | |
| SANITA LIGADA Á REDE PÚBLICA DE ESGOTOS | 07 ☐ | RETRETE/LATRINA LIGADA Á REDE PÚBLICA DE ESGOTOS | 10 ☐ |
| SANITA LIGADA Á FOSSA SÉPTICA | 08 ☐ | RETRETE/LATRINA LIGADA Á FOSSA SÉPTICA | 11 ☐ |
| SANITA LIGADA Á FOSSA ABERTA (Vala ou Río) | 09 ☐ | RETRETE/LATRINA LIGADA Á FOSSA ABERTA (Vala ou Río) | 12 ☐ |
| | | NENHUM SANITÁRIO/ AR LIVRE | 13 ☐ |
| F.05 QUAL É A PRINCIPAL FONTE DE ÁGUA, QUE ESTE AGREGADO UTILIZA PARA BEBER? | | | |
| TORNEIRA NA RESIDÉNCIA LIGADA Á REDE PÚBLICA | 01 ☐ | CACIMBA/POÇO DESPROTEGIDO | 07 ☐ |
| TORNEIRA DO PRÉDIO VIZINHO LIGADA Á REDE PÚBLICA | 02 ☐ | NASCENTE PROTEGIDA | 08 ☐ |
| CAMIÃO CISTERNA | 03 ☐ | NASCENTE DESPROTEGIDA | 09 ☐ |
| CHAFARIZ PÚBLICO | 04 ☐ | ÁGUA DE CHUVA/CHIMPACAS | 10 ☐ |
| FURO COM BOMBA | 05 ☐ | CHARCO/RIO/RIACHO | 11 ☐ |
| CACIMBA/POÇO PROTEGIDO | 06 ☐ | OUTRO | 12 ☐ |
| F.06 QUAL O TRATEMIENTO QUE O AGREGADO DÁ, HABITUALMENTE Á ÁGUA PARA BEBER? | | | |
| FERVE | 1 ☐ | FILTRA E FERVE | 5 ☐ |
| DESINFECTA COM LIXÍVIA | 2 ☐ | DEIXA REPOUSAR | 6 ☐ |
| FILTRA COM FILTRO DE ÁGUA | 3 ☐ | NENHUM TRATAMENTO | 7 ☐ |
| FILTRA DE OUTRA FORMA | 4 ☐ | OUTRO | 8 ☐ |

Use of information and communication technology (ICT) applications (digital communication technology-based systems, e.g. mobile and web systems), for data collection and management in the RWSS sector is seeing significant growth. ICT systems offer significant advantages in terms of decreasing data collection costs and improving data quality and reliability, as well as the frequency that data can be obtained. As the sector progresses and access to communication infrastructure expands, consideration can be given to developing an ICT-based data collection system. ICT systems in the water and sanitation sector have been recently implemented in many countries for data collection and management with good

results. Various ICT applications exist for this purpose, with those most widely used being the Open Data Kit (ODK) and mWater platforms, which can be set up to develop a reliable mobile platform for field data collection and updating. Using this model, municipal surveyors would use a smart-phone based tool to complete forms directly on the phone and use the device's GPS function to record the system location. Results would be fed directly into the upgraded SISAS at the provincial level, with reports generated and provided back to municipalities (many of which do not have the capacity to operate, at this time, a computerised database).

### 7.2.9 Static water system data collection

Static system data should be collected at the time of water system construction. This data is not used for sector monitoring, but does need to be collected and stored. As new systems are constructed (by any actor – government, NGO, etc.), it will be the municipality's responsibility to obtain the necessary data regarding the system and its construction. This data should be collected for each water system, and stored in a database (SISAS at provincial and national levels, paper files at the municipal level) which can be referred to if and when the need arises. The tools and systems required will be established during the NRWSSP (refer to Operations Manual). The data to be collected includes:

- Geo-referenced location;
- Actual and design population;
- Groundwater depth and yields;
- Surface water characteristics;
- System type;
- Treatment type;
- Year of construction;
- Technical design details;
- Service level, service hours & seasonality;
- Average distance to water;
- Water use/demand;
- Water quality;
- capital costs;
- Operating & maintaining costs; and
- Community management details.

### 7.2.10 Data management, reporting, dissemination and use

Experience has shown that a complex computerised database managed by central government does not result in a sustainable sector monitoring and reporting system. These databases typically fail to become rooted at the provincial and lower levels of government for various reasons including lack of ownership of the system, lack of incentive to collect and manage the data, and lack of capacity in terms of computer skills and equipment. Databases need to be designed to be user-friendly and not require constant bug-fixing by IT specialists. At lower levels of government, it must be recognised that infrastructure may be lacking and the design of the system must make an allowance for paper records at some levels of government.

SISAS is the sector's current tool for data management. Currently, the data stored in SISAS covers a wide range of information, only some of which is relevant to planning and management of the sector. SISAS should be upgraded to include some missing but useful data, eliminate data that is not necessary and to report on the small set of relevant, robust,

objective, verifiable and cost-effective indicators recommended for sector monitoring. SISAS has platforms for use at national and provincial levels. The provincial systems will need to be assessed and most will require rehabilitation and possibly simplification. At the municipal level, information management systems are required. It is critical that these databases are matched with the capabilities of local staff to manage them. In some municipalities, the system will be computerised but most will be based on the old hard copy method until staff are trained in computer and database use, and the necessary infrastructure is put in place. In either case, the information must be accessible and useful for municipal purposes.

The DNA TA proposed the development of a rural water sector database to complement SISAS, which has now been designed but not yet populated. This system will need to be reviewed within the context described here and integrated into the data collection and management process if appropriate. If the system responds well to the needs of the sector within the M&R framework suggested here it can be used going forward. However, duplicating data management efforts with a separate rural water database is not recommended; data management should be developed around the existing SISAS system without making it more complex.

Data and information should be managed and used at the level where it is needed. Each level has specific needs and uses for data. For example, increased coverage will be closely monitored and reported on by the provinces as systems are built and put into sustained operation, and most of the static information such as technical designs will be kept at the municipal and provincial levels. DNA, meanwhile, requires data for measuring progress on national indicators as well as to inform policy making and establish national standards and methodologies. Data will be reported from municipalities to the provinces and up to DNA using standard reporting formats (refer to Figure 7.1: Data flow diagram for rural water, sanitation & hygiene sub-sector monitoring).

Yearly sector reporting and evaluation will draw on the information collected to measure progress on the indicators. A sector review should be planned and coordinated by DNA to review progress throughout the country. Benchmarking between municipalities and provinces should be undertaken to compare performance using the selected indicators. An annual report showing the results achieved should be published and made available to all stakeholders as well as the international community, with a summarised version published in the national newspapers for the public. The data stored at the centre will allow for international reporting, such as to the JMP. The public should be kept informed of the Programme throughout the implementation period through a promotion campaign in local and national media (e.g. radio, television), including the current situation, progress and the results achieved. Communications messages will draw on the sector review and annual report.

Yearly planning workshops should be held at all levels, starting at the municipality and rolling up through the provinces to the centre. Planning and resource allocation will become dependent on performance and progress on the indicators. Planning decisions should be based on equitable distribution principles and the data collected will inform these decisions. Municipalities will be responsible, working within the DRA context and with assistance from DPEA and the NRWSSP Provincial-TA team, to develop annual plans and budgets based on demand from communities and confirmation of community eligibility. As the programme progresses, DPEA will provide supervision to ensure the rules and regulations are being followed and standards being met. DPEA will review and consolidate plans for submission to the NRWSSP PMU initially and eventually to the national fund for approval. Funds would be allocated directly to municipalities.

The data can be further used and integrated into planning through mapping geo-referenced data. It is likely, at least at the beginning of the NRWSSP, that mapping will occur at the provincial level as municipalities likely do not have the necessary skills or technology. The

programme should aim to transfer this capacity to the municipalities over time. Mapping requires that water system coordinates be recorded using GPS. This would be required at the time of system construction or through a data collection campaign for existing systems. Using a mobile phone-based platform such as ODK, the coordinates are recorded using the phone's GPS system and are uploaded into an Excel spreadsheet with other system data. The spreadsheet is then used to automatically generate Google Earth maps which provide a visual representation of system distribution and help in the equitable planning of new services or rehabilitation of existing systems. The system can be used with or without an internet connection. Furthermore, the system does not require the writing of complex programs as it is based on phone applications that are available at no cost[41].

## 7.3 Monitoring and reporting for maintenance and repair

### 7.3.1 Background

There is currently no systematic reporting of water system breakdowns from the GAS to the local authorities responsible for conducting repairs that are beyond the capacity of the community. This results in systems that are broken down for long periods of time. In the worst case, this can result in systems that become irreparable. The municipality is responsible for post-construction support, including system repairs, however if they are not made aware of a breakdown no action can be taken. Additionally, if information is not shared between the municipality and the GAS, enabling the GAS to hold the municipality to account, there is little incentive for the municipality to act quickly.

System functionality will be monitored as part of the sector monitoring system (refer to Section 7.2); however this presents only a snapshot in time (annually) and does not aid communities when their systems break down. A real-time reporting system for communities to report problems via the GAS to the municipality is required to improve the sustainability of the infrastructure.

### 7.3.2 Objectives of monitoring for maintenance and repair

Monitoring of water system functionality (breakdowns) in real-time is required to enable systems to be repaired in a timely manner. The specific objectives of monitoring and reporting for maintenance and repair are to:

- Inform relevant stakeholders of breakdowns and repairs as they occur;
- Facilitate timely maintenance and repairs; and
- Enable causes of dis-functionality to be determined and improvements made.

Monitoring and reporting for maintenance and repair should act as a tool for communities, *comunas* and municipalities to monitor schemes and identify problems to assist in maintaining water supply systems.

### 7.3.3 Organisational framework, roles & responsibilities

The organisational framework, roles and responsibilities for monitoring and reporting for system maintenance and repair should be integrated into the evolving post-construction support framework, rooted primarily in MoGeCA or in the alternative public-private partnership model to be developed. As the entity responsible for the provision of water and sanitation services, including post-construction support, the municipality should be the focus for the development of the monitoring system. It is there that data on system functionality is most needed to enable the municipality to respond to breakdowns. The municipality will be

[41] http://opendatakit.org/

responsible for managing data collection, with breakdowns being reported by each GAS on an as-needed basis.

The province will eventually be responsible for monitoring the municipal response to breakdowns, though initially it will be supported in this task by the Provincial-TA teams. It will ensure timely reporting from municipalities and will provide technical assistance and capacity building to municipalities as required. At the central level, DNA will monitor provincial performance in maintaining sustainable systems. Funding needs to be provided for these M&R activities and should become a part of the regular budgeting process for post-construction support. Table 7.3 summarises the roles and responsibilities of the various stakeholders for M&R for maintenance and repair.

**Table 7.3: Roles and responsibilities of stakeholders for M&R for maintenance and repair**

| STAKEHOLDER | ROLES & RESPONSIBILITIES |
|---|---|
| GAS | • Report on breakdowns on an as-needed basis.<br>• Repair minor failures and breakdowns; conduct routine maintenance. |
| *Comunas* | • Act as liaison to the municipality for transmitting information on breakdowns. |
| Municipalities | • Respond in a timely manner to system breakdowns as they arise.<br>• Keep stakeholders informed of progress on repairs requested.<br>• Maintain records on breakdowns and repairs conducted. |
| Private Sector | • Respond in a timely manner to system breakdowns as they arise.<br>• Keep stakeholders informed of progress on repairs requested.<br>• Maintain records on breakdowns and repairs conducted.<br>(Dependent on model of PPP selected) |
| DPEA | • Monitor municipality response to breakdowns.<br>• Provide technical assistance and capacity building. |
| DNA | • Monitor provincial performance in maintaining sustainable systems. |

Figure 7.3 presents the expected flow of information and how it will be used.

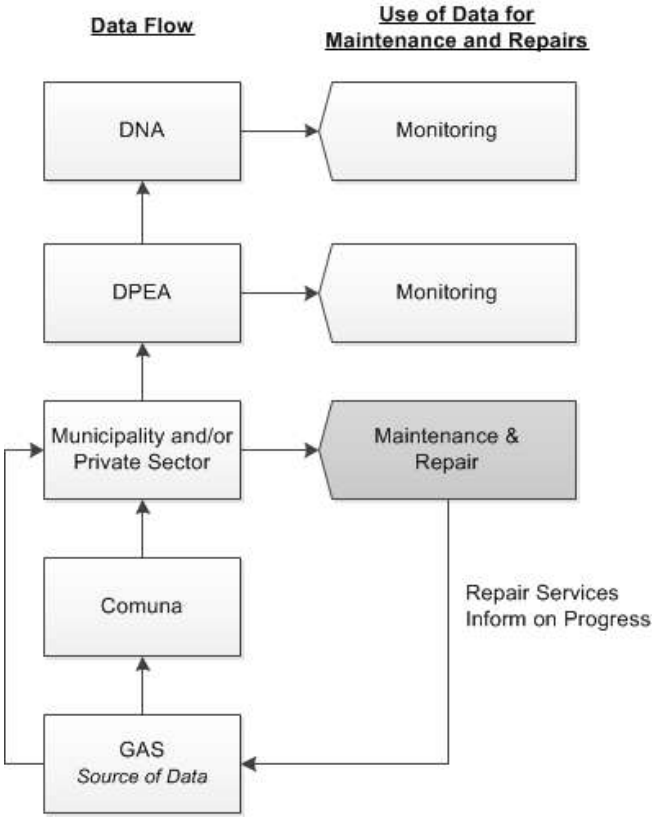
### 7.3.4 Data collection for maintenance and repair

The purpose of monitoring system breakdowns in real time is to ensure that government responds when systems stop functioning. The information should be easily reported by the GAS to the *comuna* and municipality to enable government to respond when there is a problem with the water system that is beyond the capacity of the community to solve. The system should enable improvement in the efficiency of reporting faults; trigger action in the form of system repair; and improve efficiency in updating information systems[42].

The GAS would report to the *comuna* and municipality when a breakdown of their system occurs which they are unable to repair themselves or with the assistance of a local mechanic. The information to be reported would include details on the type of system, type and extent of breakdown and any other technical data that the GAS is able to provide (e.g. parts required). In the majority of communities, for the time-being, reports will be made through existing communication channels, for example via the Soba (traditional leader) up through the administrative system. The GAS need to be made aware of this process and provided with the information necessary to report breakdowns. This system will only become sustainable if the municipality responds in a timely manner to repair the systems. If the municipality does not respond, or is slow to respond, there will be no incentive for the GAS to report system breakdowns.

[42] Abisa, J. (2013). *Using Mobile Phones for Monitoring Functionality of Rural Water Sources in Uganda*. WSP-RWSN Webinar Series. Prepared for IRC/Triple-S Uganda.

**Figure 7.3: Data flow diagram for M&R for maintenance and repair**




In some cases, particularly as the sector evolves, where mobile phone coverage exists and where the GAS and municipality have access to mobile phones, an SMS-based system could be piloted. The system would allow for breakdown of systems to be reported to the municipality by the GAS via mobile phones. This will allow municipalities to react to breakdowns in a timelier manner and has the potential to drastically decrease the amount of time a community is without service. Several examples exist of simple ICT systems for this purpose, such as the Mobile4Water system in Uganda, majiVoice in Kenya and mWater in Senegal. With the Mobile4Water system, for example, water points were marked with an identifier and a dedicated phone number. When a breakdown occurs, a member of the water committee or anyone from the public can report it by sending a coded SMS with the ID of the water point. The system then creates a ticket to notify the municipality, responsible stakeholders as well as a local hand pump mechanic assigned to the water point. Over time, the status of water points can be viewed for particular locations or areas in the form of aggregated reports, and information is also fed back to the water users regarding their ticket, improving transparency and accountability.

### 7.3.5 Data management, reporting, dissemination and use

Data will be managed by the municipality. Records should be kept regarding system breakdowns and the technical details of their repair. This information will be summarised and reported to the province, which will then be aggregated and reported to DNA on an annual basis. The NRWSSP will develop these standard reporting formats (refer to Operations Manual). The main use of this data is for municipalities to be able to respond when breakdowns occur. The information can also be used as part of overall sector monitoring to measure progress on system sustainability and in planning and budgeting for post-construction support.

The municipality will be responsible for reporting back to the GAS on the progress of repairs. The reporting and repair information system needs to be transparent, to enable the GAS to hold the municipality to account. This feedback process will be developed within the existing communication channels as part of the NRWSSP. Within the water component of the NRWSSP, communities and their GAS will be informed of their rights and responsibilities in terms of reporting and being provided with information. This will strengthen the system and provide an incentive for the municipality to respond to breakdowns in a timely manner.

## 7.4 Process monitoring of the NRWSSP

The NRWSSP has specific expected results and targets towards which progress needs to be monitored. Additionally, the programme has been developed to learn from the pilot in Phase 1 and refine the strategies as necessary for national roll-out in Phase 2. Programme monitoring should provide the information required to manage the programme, as well as evaluate and improve on the implementation through its Phases. It is built on pre-defined process and output indicators that are deemed appropriate to measure the progress of programme activities. The specific objectives of programme monitoring are to:

- Provide management information to compare actual with planned performance;
- Enable assessment of progress towards results and targets;
- Inform effective and transparent programme management and decision-making;
- Assist in the identification of problems and mitigation measures; and
- Monitor the ability of stakeholders to implement the programme.

A concise list of programme indicators has been developed and is included in the Operations Manual. These indicators will serve to alert management to problems that need to be addressed and successes that need to be documented.

# 8 INVESTMENT PLAN

## 8.1 General

By 2026, DNA plans to provide service to 80% of residents in each of the country's 18 provinces, partially through investing in the provision of water supply services in rural communities. The following sections develop estimates for the following planned programme inputs:

- water supply infrastructure direct costs;
- sanitation & hygiene promotion direct costs;
- monitoring & reporting direct costs;
- capacity development direct costs; and
- overall programme management costs.

In all cases, future costs presented in the plan are based on 2014 estimates subject to 3.0% per annum inflation. Present value calculations use a discount rate of 14.0%.
Investments in water supply infrastructure are based on:

- Current and future population estimates;
- Current estimates of water supply coverage (number of people served);
- Target levels of water supply coverage (number of people served); and
- Indicative per-capita costs for water supply infrastructure.

The following sections provide the methodology and detailed calculations supporting this estimate.

### 8.1.1 Current total population and water supply coverage

**National context**

Nationally, DNA water supply coverage was estimated by MINEA to be 37% based on data contained in SISAS which was collected between 2008 and 2012 as shown in Table 8.1. Comments on the reliability of this data are presented in the Phase 1 report, and include: i) the lack of a recent census and the likelihood that SISAS population figures are low; ii) irregularities in estimation of actual water supply coverage at each location registered in the system; iii) age and completeness of the data. As such, the estimates of existing population and water supply coverage based on DNA and presented here and data are approximations at best.

**Table 8.1: Population and coverage in water supply – national (2009)**

| PROVINCIA | NO. OF MUN. | NO. OF *COMUNAS* | TOTAL POP. (x1000) | POP. WITH SERVICE | |
|---|---|---|---|---|---|
| | | | | NO. x1000 | % |
| Bengo | 8 | 33 | 271.9 | 125.0 | 46% |
| Benguela | 9 | 38 | 1,597.3 | 1,299.3 | 81% |
| Bié | 9 | 39 | 901.1 | 162.7 | 18% |
| Cabinda | 4 | 12 | 349.5 | 90.9 | 26% |
| Cunene | 6 | 20 | 507.6 | 77.1 | 15% |
| Huambo | 11 | 36 | 1,239.8 | 312.6 | 25% |
| Huíla | 14 | 65 | 1,683.6 | 666.4 | 40% |
| Kuando Kubango | 9 | 30 | 306.2 | 65.1 | 21% |
| Kuanza Norte | 10 | 31 | 291.3 | 115.1 | 40% |
| Kuanza Sul | 12 | 36 | 1,036.5 | 275.6 | 27% |
| Luanda | 9 | 33 | 4,749.4 | 1,851.3 | 39% |
| Lunda - Norte | 9 | 24 | 605.0 | 223.7 | 37% |
| Lunda Sul | 4 | 14 | 300.3 | 50.3 | 17% |
| Malanje | 14 | 51 | 598.1 | 133.1 | 22% |
| Moxico | 9 | 29 | 444.2 | 144.2 | 32% |
| Namibe | 5 | 14 | 289.1 | 186.0 | 64% |
| Uíge | 16 | 47 | 890.8 | 214.2 | 24% |
| Zaíre | 6 | 25 | 306.1 | 41.6 | 14% |
| **TOTAL** | **164** | **577** | **16,367.9** | **6,034.2** | **37%** |

*Source: DNA 2012*

## NRWSSP rural population

Of the total number of 577 *comunas* represented nationally, DNA has selected 372 *comunas* which present predominantly rural characteristics and which will be included in this NRWSSP investment plan.

Table 8.2 provides current estimates of population and water supply coverage in this reduced list of locations, based on 2009 data within SISAS. Total current population in these locations across all 18 provinces is estimated at 4.20M inhabitants, of which only 15% is estimated to have access to water supply services, well below the national average. This level of access is also the case within the provinces selected for pilot activities (Huambo, Lunda Sul and Uige), where approximately 15% of a total population of 0.77M residents are estimated to have such access.

This investment plan will address needs related to this reduced list of predominantly rural population centres defined by DNA and shown in future population and water supply coverage needs

## Population projections

A population growth rate of 1.4% per annum has been used to project future populations within the predominantly rural areas in which the NRWSSP will be active. As shown in Table 8.4, this will see the estimated total population of NRWSSP selected locations rise from 4.5M to 5.33M by 2026. Within the three Phase 1 provinces, the estimated total population of selected locations will rise from 0.825M to 0.975M.

**Table 8.2: Estimated population & coverage in water supply – NRWSSP locations (2009)**

| PROVINCE | NO. OF MUN. | NO. OF COMUNAS (1) | POP. (X1000) | POP. SERVED (X1000) | POP. SERVED % |
|---|---|---|---|---|---|
| Bengo | 8 | 21 | 116.0 | 25.1 | 22% |
| Benguela | 8 | 21 | 307.3 | 93.0 | 30% |
| Bié | 9 | 29 | 425.7 | 56.2 | 13% |
| Cabinda | 4 | 7 | 64.0 | 7.3 | 11% |
| Cunene | 6 | 14 | 273.8 | 27.7 | 10% |
| Huambo (2) | 11 | 25 | 375.3 | 83.8 | 22% |
| Huíla | 14 | 45 | 651.8 | 157.5 | 24% |
| Kuando Kubango | 9 | 21 | 70.2 | 7.4 | 11% |
| Kuanza Norte | 9 | 18 | 82.1 | 14.5 | 18% |
| Kuanza Sul | 12 | 23 | 340.0 | 30.9 | 9% |
| Luanda | 5 | 6 | 388.8 | 8.1 | 2% |
| Lunda - Norte | 9 | 16 | 233.6 | 24.5 | 10% |
| Lunda Sul (2) | 4 | 10 | 141.6 | 5.4 | 4% |
| Malanje | 14 | 37 | 259.9 | 24.0 | 9% |
| Moxico | 6 | 20 | 91.3 | 25.8 | 28% |
| Namibe | 5 | 9 | 45.4 | 17.1 | 38% |
| Uíge (2) | 13 | 31 | 252.9 | 30.1 | 12% |
| Zaíre | 6 | 19 | 85.0 | 4.7 | 6% |
| **TOTAL - NRWSSP** | **152** | **372** | **4,204.6** | **643.0** | **15%** |
| **TOTAL - PILOT PROV.** | **28** | **66** | **769.8** | **119.2** | **15%** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

*3. Source: DNA 2012*

## Phasing

As discussed further in the Operations Manual, Phase 1 of the NRWSSP will implement pilot activities in the provinces of Huambo, Lunda Sul and Uíge during the period 2015-2018. As communities in these provinces gain access to new services, pilot activities will allow the programme to develop models, mechanisms, and methodologies as well as strengthening institutional and human capacities necessary for execution and beyond. Phase 2 (2019-2022) is expected to mark the national roll-out of the full contingent of the provisions of the NRWSSP. Phase 3 will run from and 2023-2026 and marks the transition of the NRWSSP funding mechanism from the PMU to a national fund.

It is anticipated that work currently ongoing under the current national Water For All Programme (PAT) will continue in other areas of the country, meaning that for a period of time there will be two major rural water initiatives working towards a common goal, with PAT operating under its existing framework, and a fast-tracked NRWSSP pilot programme instituting and fully operationalising a new approach which ensures the universal provision of sustainable, high quality rural water supply and sanitation services.

Once the pilot programme (Phase 1 of the NRWSSP) has been completed, the procedures, policies, and approaches will be implemented at the national level. Programmes such as PAT will be required to adopt the NRWSSP approaches and strategies, and may either continue to operate under these new rules and guidelines, or transfer funding over to the NRWSSP, as decided by national authorities. In the end, the source of investment funding is far less important than the use by any funding source of the NRWSSP guidelines and standards.

The investment requirements presented here address all 372 *comunas* around the country which have been identified by DNA as predominantly rural in nature (see Section “NRWSSP rural population” on the previous page.), regardless of funding source and programme, and

as such some locations may be served by Water for All, while others will be served by the NRWSSP or other programmes.

**Water supply targets**

The NRWSSP will work within the strategic planning structure and existing set of progress indicators for water supply access established by the government, however various targets have been articulated by different institutions and programs, as shown in Table 8.3.

**Table 8.3: Multiple existing targets for access to water supply**

| TARGET | *MDG* | *COUNCIL OF MIN. RES. 10/04* | *WATER FOR ALL* | *MPLA GOVERNING PLAN* |
|---|---|---|---|---|
| TARGET DATE | *2015* | *2016* | *2012* | *2017* |
| RURAL TARGET | 70% | 70% | 80% | 80% |
| URBAN TARGET | 69% | 67% | - | 100% |
| TOTAL TARGET | 70% | 68% | - | 92% |

*Source: INE (2010); MPLA (2012); MINAMB (2012); Government of Angola (2004)*

The Council of Ministers' Resolution 10/04 and the Millennium Development Goals use a target for rural water supply of 70% to be reached by 2015 and 2016 respectively, while the Water for All programme had an official target of attaining 80% coverage by 2012.

In discussion with DNA, this investment plan for the 2014 – 2026 period adopts a target of 80% for those *comunas* selected for inclusion in the rural programme. Based on the current estimates of population and access to water supplies as defined within SISAS, Table 8.4 presents suggested annual coverage targets by year for the duration of the planning period, specifically:

- Phase 1 will see focused pilot activities in the provinces of Huambo, Lunda Sul and Uige, allowing participating *comunas* (those included in this plan) in these provinces to increase coverage in water supply from 14% to 70% by the end of 2018, benefiting approximately 0.489M residents with new services. It is assumed that work will also continue to be funded in other provinces during this period, resulting in a national increase in coverage levels from 14% to 41% by the end of Phase 1 in 2018, providing approximately 1.288M residents with new services.
- Phase 2 and Phase 3 will see increased activity in remaining provinces, bringing all provinces to approximately 80% coverage (amongst participating *comunas*) by the end of the programme in 2026. An additional 2.330M residents will gain access to services during Phases 2 and 3, bringing the total number of Programme beneficiaries to approximately 3.617M over the 12-year period.

Figure 8.1 and Figure 8.2 illustrate this projected progress graphically for the NRWSSP programme as a whole as well as for the pilot provinces of Uige, Lunda Sul and Huambo which will receive focused investment during Phase 1.

Annex B1 provides detailed calculations of population and coverage targets, for each specific *comuna* included in the plan.

**Figure 8.1 NRWSSP population projections & water supply coverage targets (x1000)**

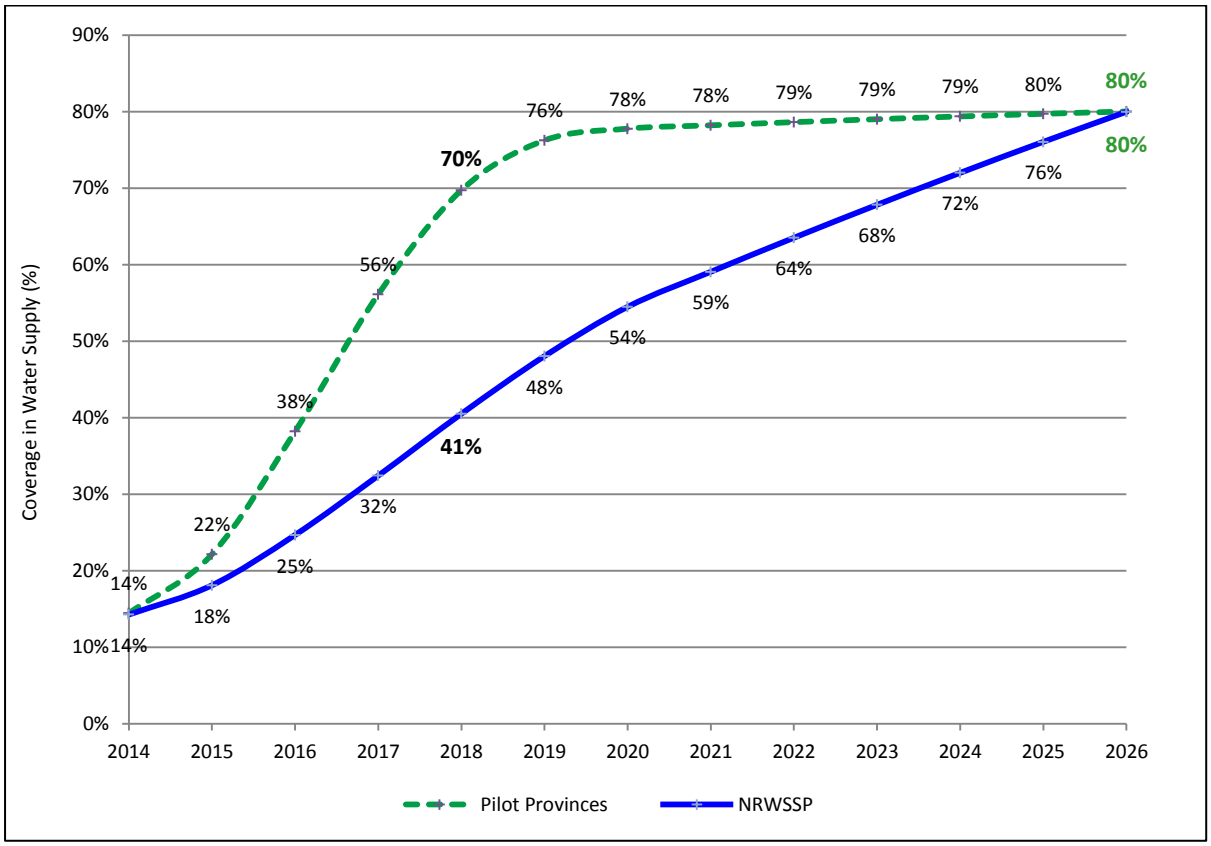



**Figure 8.2: Water supply coverage targets (%)**

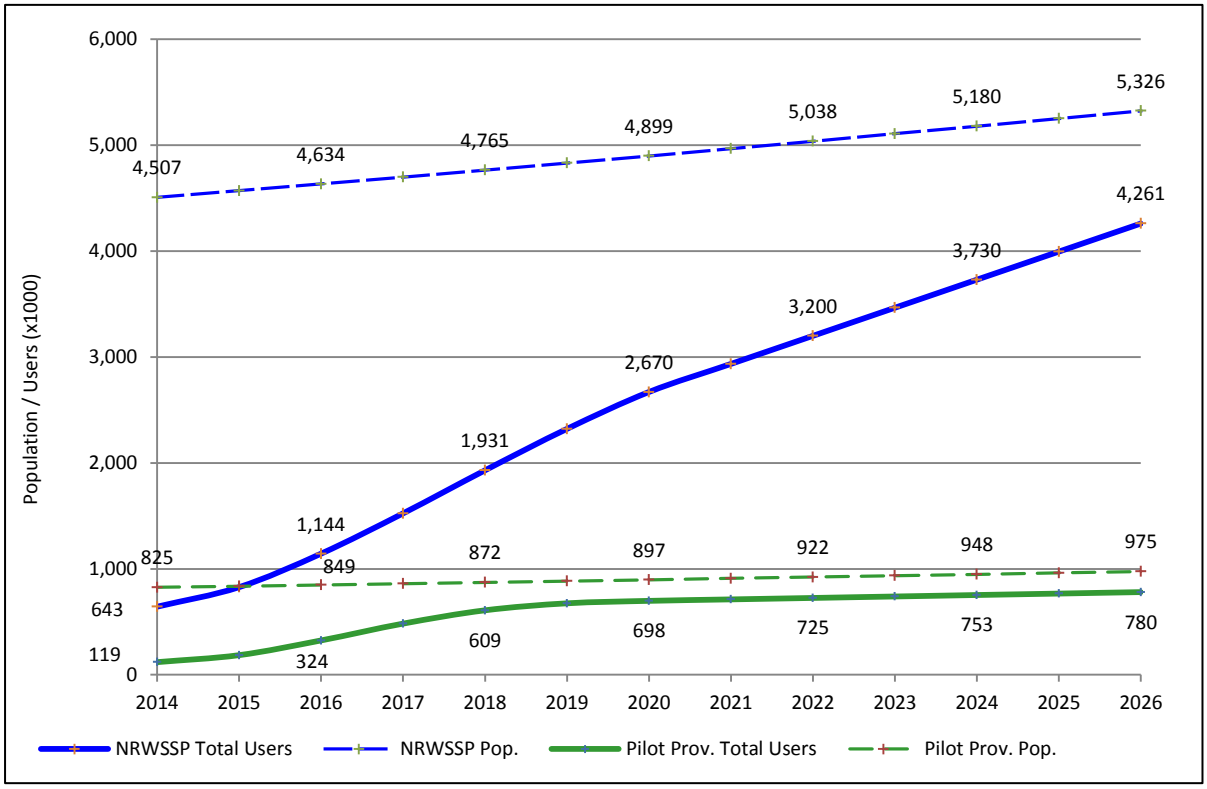


**Table 8.4: Projected NRWSSP targets for access to water supply services (x1000)**

| PROV. | 2014 | | | | 2015 | | | | 2016 | | | | 2017 | | | | 2018 | | | | 2019 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS |
| **ALL PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | 124.4 | 0.0 | 25.1 | 20% | 126.1 | 3.8 | 28.9 | 23% | 127.9 | 5.7 | 34.5 | 27% | 129.7 | 7.1 | 41.6 | 32% | 131.5 | 9.0 | 50.6 | 38% | 133.3 | 10.4 | 61.0 | 46% | 135.2 | 10.4 | 71.4 | 53% |
| Benguela | 329.4 | 0.0 | 93.0 | 28% | 334.0 | 9.2 | 102.3 | 31% | 338.7 | 13.9 | 116.1 | 34% | 343.4 | 17.3 | 133.4 | 39% | 348.2 | 21.9 | 155.4 | 45% | 353.1 | 25.4 | 180.8 | 51% | 358.0 | 25.4 | 206.2 | 58% |
| Bié | 456.3 | 0.0 | 56.2 | 12% | 462.7 | 14.9 | 71.1 | 15% | 469.2 | 22.4 | 93.5 | 20% | 475.7 | 28.0 | 121.4 | 26% | 482.4 | 35.4 | 156.8 | 33% | 489.2 | 41.0 | 197.8 | 40% | 496.0 | 41.0 | 238.8 | 48% |
| Cabinda | 68.6 | 0.0 | 7.3 | 11% | 69.6 | 2.3 | 9.5 | 14% | 70.6 | 3.4 | 13.0 | 18% | 71.6 | 4.3 | 17.2 | 24% | 72.6 | 5.4 | 22.6 | 31% | 73.6 | 6.3 | 28.9 | 39% | 74.6 | 6.3 | 35.2 | 47% |
| Cunene | 293.5 | 0.0 | 27.7 | 9% | 297.6 | 9.8 | 37.5 | 13% | 301.8 | 14.8 | 52.2 | 17% | 306.0 | 18.4 | 70.7 | 23% | 310.3 | 23.4 | 94.0 | 30% | 314.6 | 27.0 | 121.1 | 38% | 319.0 | 27.0 | 148.1 | 46% |
| Huambo (2) | 402.3 | 0.0 | 83.8 | 21% | 408.0 | 30.4 | 114.2 | 28% | 413.7 | 63.8 | 178.0 | 43% | 419.5 | 72.9 | 250.9 | 60% | 425.4 | 57.7 | 308.6 | 73% | 431.3 | 30.4 | 339.0 | 79% | 437.4 | 10.6 | 349.6 | 80% |
| Huila | 698.7 | 0.0 | 157.5 | 23% | 708.5 | 20.8 | 178.3 | 25% | 718.4 | 31.1 | 209.4 | 29% | 728.5 | 38.9 | 248.3 | 34% | 738.7 | 49.3 | 297.6 | 40% | 749.0 | 57.1 | 354.7 | 47% | 759.5 | 57.1 | 411.8 | 54% |
| Kuando Kubango | 75.3 | 0.0 | 7.4 | 10% | 76.3 | 2.5 | 10.0 | 13% | 77.4 | 3.8 | 13.7 | 18% | 78.5 | 4.7 | 18.4 | 23% | 79.6 | 6.0 | 24.4 | 31% | 80.7 | 6.9 | 31.3 | 39% | 81.8 | 6.9 | 38.2 | 47% |
| Kuanza Norte | 88.0 | 0.0 | 14.5 | 16% | 89.3 | 2.8 | 17.2 | 19% | 90.5 | 4.2 | 21.4 | 24% | 91.8 | 5.2 | 26.6 | 29% | 93.1 | 6.6 | 33.2 | 36% | 94.4 | 7.6 | 40.8 | 43% | 95.7 | 7.6 | 48.4 | 51% |
| Kuanza Sul | 364.4 | 0.0 | 30.9 | 8% | 369.5 | 12.3 | 43.2 | 12% | 374.7 | 18.5 | 61.7 | 16% | 380.0 | 23.1 | 84.8 | 22% | 385.3 | 29.2 | 114.0 | 30% | 390.7 | 33.9 | 147.9 | 38% | 396.1 | 33.9 | 181.7 | 46% |
| Luanda | 416.8 | 0.0 | 8.1 | 2% | 422.6 | 14.9 | 23.0 | 5% | 428.5 | 22.3 | 45.3 | 11% | 434.5 | 27.9 | 73.2 | 17% | 440.6 | 35.3 | 108.5 | 25% | 446.8 | 40.9 | 149.4 | 33% | 453.0 | 40.9 | 190.3 | 42% |
| Lunda Norte | 250.4 | 0.0 | 24.5 | 10% | 253.9 | 8.4 | 32.8 | 13% | 257.4 | 12.5 | 45.4 | 18% | 261.1 | 15.7 | 61.1 | 23% | 264.7 | 19.9 | 80.9 | 31% | 268.4 | 23.0 | 103.9 | 39% | 272.2 | 23.0 | 126.9 | 47% |
| Lunda Sul (2) | 151.8 | 0.0 | 5.4 | 4% | 153.9 | 13.4 | 18.7 | 12% | 156.1 | 28.1 | 46.8 | 30% | 158.3 | 32.1 | 78.9 | 50% | 160.5 | 25.4 | 104.3 | 65% | 162.7 | 13.4 | 117.6 | 72% | 165.0 | 4.7 | 122.3 | 74% |
| Malanje | 278.6 | 0.0 | 24.0 | 9% | 282.5 | 9.4 | 33.4 | 12% | 286.4 | 14.1 | 47.5 | 17% | 290.4 | 17.6 | 65.1 | 22% | 294.5 | 22.3 | 87.4 | 30% | 298.6 | 25.8 | 113.3 | 38% | 302.8 | 25.8 | 139.1 | 46% |
| Moxico | 97.9 | 0.0 | 25.8 | 26% | 99.3 | 2.8 | 28.6 | 29% | 100.6 | 4.2 | 32.8 | 33% | 102.1 | 5.2 | 38.0 | 37% | 103.5 | 6.6 | 44.7 | 43% | 104.9 | 7.7 | 52.4 | 50% | 106.4 | 7.7 | 60.1 | 56% |
| Namibe | 48.7 | 0.0 | 17.1 | 35% | 49.3 | 1.3 | 18.4 | 37% | 50.0 | 1.9 | 20.3 | 41% | 50.7 | 2.4 | 22.7 | 45% | 51.4 | 3.0 | 25.7 | 50% | 52.2 | 3.5 | 29.2 | 56% | 52.9 | 3.5 | 32.6 | 62% |
| Uige (2) | 271.1 | 0.0 | 30.1 | 11% | 274.9 | 22.4 | 52.5 | 19% | 278.7 | 47.0 | 99.5 | 36% | 282.6 | 53.7 | 153.2 | 54% | 286.6 | 42.5 | 195.7 | 68% | 290.6 | 22.4 | 218.1 | 75% | 294.7 | 7.8 | 225.9 | 77% |
| Zaire | 91.1 | 0.0 | 4.7 | 5% | 92.4 | 3.2 | 7.9 | 9% | 93.7 | 4.7 | 12.6 | 13% | 95.0 | 5.9 | 18.6 | 20% | 96.3 | 7.5 | 26.1 | 27% | 97.7 | 8.7 | 34.8 | 36% | 99.1 | 8.7 | 43.5 | 44% |
| **TOTAL** | **4,507** | **0** | **643** | **14%** | **4,570** | **184** | **827** | **18%** | **4,634** | **316** | **1,144** | **25%** | **4,699** | **380** | **1,524** | **32%** | **4,765** | **406** | **1,931** | **41%** | **4,832** | **391** | **2,322** | **48%** | **4,899** | **348** | **2,670** | **54%** |
| **PILOT PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Huambo | 402.3 | 0.0 | 83.8 | 21% | 408.0 | 30.4 | 114.2 | 28% | 413.7 | 63.8 | 178.0 | 43% | 419.5 | 72.9 | 250.9 | 60% | 425.4 | 57.7 | 308.6 | 73% | 431.3 | 30.4 | 339.0 | 79% | 437.4 | 10.6 | 349.6 | 80% |
| Lunda Sul | 151.8 | 0.0 | 5.4 | 4% | 153.9 | 13.4 | 18.7 | 12% | 156.1 | 28.1 | 46.8 | 30% | 158.3 | 32.1 | 78.9 | 50% | 160.5 | 25.4 | 104.3 | 65% | 162.7 | 13.4 | 117.6 | 72% | 165.0 | 4.7 | 122.3 | 74% |
| Uige | 271.1 | 0.0 | 30.1 | 11% | 274.9 | 22.4 | 52.5 | 19% | 278.7 | 47.0 | 99.5 | 36% | 282.6 | 53.7 | 153.2 | 54% | 286.6 | 42.5 | 195.7 | 68% | 290.6 | 22.4 | 218.1 | 75% | 294.7 | 7.8 | 225.9 | 77% |
| **TOTAL** | **825** | **0** | **119** | **14%** | **837** | **66** | **185** | **22%** | **849** | **139** | **324** | **38%** | **860** | **159** | **483** | **56%** | **872** | **126** | **609** | **70%** | **885** | **66** | **675** | **76%** | **897** | **23** | **698** | **78%** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

**Table 8.4 (continued): Projected NRWSSP targets for access to water supply services, continued (x1000)**

| PROV. | 2021 | | | | 2022 | | | | 2023 | | | | 2024 | | | | 2025 | | | | 2026 | | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. POP.. | NEW ACCESS | TOTAL ACCESS | % ACCESS | EST. TOTAL POP. | TOTAL NEW ACCESS | TOTAL ACCESS | % ACCESS |
| **ALL PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | 137.1 | 8.0 | 79.4 | 58% | 139.0 | 8.0 | 87.5 | 63% | 141.0 | 8.0 | 95.5 | 68% | 142.9 | 8.0 | 103.5 | 72% | 144.9 | 8.0 | 111.6 | 77% | 147.0 | 8.0 | 119.6 | 81% | 147.0 | 94.5 | 119.6 | 81% |
| Benguela | 363.0 | 19.6 | 225.8 | 62% | 368.1 | 19.6 | 245.5 | 67% | 373.3 | 19.6 | 265.1 | 71% | 378.5 | 19.6 | 284.8 | 75% | 383.8 | 19.6 | 304.4 | 79% | 389.2 | 19.6 | 324.0 | 83% | 389.2 | 231.0 | 324.0 | 83% |
| Bié | 503.0 | 31.7 | 270.5 | 54% | 510.0 | 31.7 | 302.2 | 59% | 517.1 | 31.7 | 333.8 | 65% | 524.4 | 31.7 | 365.5 | 70% | 531.7 | 31.7 | 397.2 | 75% | 539.2 | 31.7 | 428.9 | 80% | 539.2 | 372.7 | 428.9 | 80% |
| Cabinda | 75.7 | 4.8 | 40.0 | 53% | 76.7 | 4.8 | 44.8 | 58% | 77.8 | 4.8 | 49.7 | 64% | 78.9 | 4.8 | 54.5 | 69% | 80.0 | 4.8 | 59.3 | 74% | 81.1 | 4.8 | 64.2 | 79% | 81.1 | 56.9 | 64.2 | 79% |
| Cunene | 323.5 | 20.9 | 169.0 | 52% | 328.0 | 20.9 | 189.9 | 58% | 332.6 | 20.9 | 210.8 | 63% | 337.3 | 20.9 | 231.7 | 69% | 342.0 | 20.9 | 252.6 | 74% | 346.8 | 20.9 | 273.5 | 79% | 346.8 | 245.8 | 273.5 | 79% |
| Huambo (2) | 443.5 | 6.3 | 355.9 | 80% | 449.7 | 6.3 | 362.3 | 81% | 456.0 | 6.3 | 368.6 | 81% | 462.4 | 6.3 | 374.9 | 81% | 468.8 | 6.3 | 381.3 | 81% | 475.4 | 6.3 | 387.6 | 82% | 475.4 | 303.8 | 387.6 | 82% |
| Huila | 770.2 | 44.1 | 455.9 | 59% | 780.9 | 44.1 | 500.0 | 64% | 791.9 | 44.1 | 544.1 | 69% | 803.0 | 44.1 | 588.2 | 73% | 814.2 | 44.1 | 632.3 | 78% | 825.6 | 44.1 | 676.4 | 82% | 825.6 | 518.9 | 676.4 | 82% |
| Kuando Kubango | 82.9 | 5.3 | 43.5 | 52% | 84.1 | 5.3 | 48.9 | 58% | 85.3 | 5.3 | 54.2 | 64% | 86.5 | 5.3 | 59.5 | 69% | 87.7 | 5.3 | 64.9 | 74% | 88.9 | 5.3 | 70.2 | 79% | 88.9 | 62.8 | 70.2 | 79% |
| Kuanza Norte | 97.0 | 5.9 | 54.3 | 56% | 98.4 | 5.9 | 60.2 | 61% | 99.8 | 5.9 | 66.1 | 66% | 101.2 | 5.9 | 72.0 | 71% | 102.6 | 5.9 | 77.9 | 76% | 104.0 | 5.9 | 83.7 | 81% | 104.0 | 69.3 | 83.7 | 81% |
| Kuanza Sul | 401.7 | 26.2 | 207.9 | 52% | 407.3 | 26.2 | 234.0 | 57% | 413.0 | 26.2 | 260.2 | 63% | 418.8 | 26.2 | 286.4 | 68% | 424.7 | 26.2 | 312.5 | 74% | 430.6 | 26.2 | 338.7 | 79% | 430.6 | 307.8 | 338.7 | 79% |
| Luanda | 459.4 | 31.6 | 221.9 | 48% | 465.8 | 31.6 | 253.4 | 54% | 472.3 | 31.6 | 285.0 | 60% | 478.9 | 31.6 | 316.6 | 66% | 485.6 | 31.6 | 348.2 | 72% | 492.4 | 31.6 | 379.8 | 77% | 492.4 | 371.7 | 379.8 | 77% |
| Lunda Norte | 276.0 | 17.8 | 144.7 | 52% | 279.8 | 17.8 | 162.5 | 58% | 283.8 | 17.8 | 180.3 | 64% | 287.7 | 17.8 | 198.0 | 69% | 291.8 | 17.8 | 215.8 | 74% | 295.8 | 17.8 | 233.6 | 79% | 295.8 | 209.1 | 233.6 | 79% |
| Lunda Sul (2) | 167.3 | 2.8 | 125.1 | 75% | 169.7 | 2.8 | 127.9 | 75% | 172.0 | 2.8 | 130.6 | 76% | 174.5 | 2.8 | 133.4 | 76% | 176.9 | 2.8 | 136.2 | 77% | 179.4 | 2.8 | 139.0 | 77% | 179.4 | 133.6 | 139.0 | 77% |
| Malanje | 307.1 | 20.0 | 159.1 | 52% | 311.4 | 20.0 | 179.1 | 58% | 315.7 | 20.0 | 199.1 | 63% | 320.1 | 20.0 | 219.0 | 68% | 324.6 | 20.0 | 239.0 | 74% | 329.2 | 20.0 | 259.0 | 79% | 329.2 | 235.0 | 259.0 | 79% |
| Moxico | 107.9 | 5.9 | 66.0 | 61% | 109.4 | 5.9 | 72.0 | 66% | 110.9 | 5.9 | 77.9 | 70% | 112.5 | 5.9 | 83.9 | 75% | 114.1 | 5.9 | 89.8 | 79% | 115.7 | 5.9 | 95.8 | 83% | 115.7 | 70.0 | 95.8 | 83% |
| Namibe | 53.6 | 2.7 | 35.3 | 66% | 54.4 | 2.7 | 38.0 | 70% | 55.1 | 2.7 | 40.7 | 74% | 55.9 | 2.7 | 43.4 | 78% | 56.7 | 2.7 | 46.1 | 81% | 57.5 | 2.7 | 48.8 | 85% | 57.5 | 31.7 | 48.8 | 85% |
| Uige (2) | 298.8 | 4.7 | 230.6 | 77% | 303.0 | 4.7 | 235.2 | 78% | 307.2 | 4.7 | 239.9 | 78% | 311.5 | 4.7 | 244.5 | 79% | 315.9 | 4.7 | 249.2 | 79% | 320.3 | 4.7 | 253.9 | 79% | 320.3 | 223.8 | 253.9 | 79% |
| Zaire | 100.4 | 6.7 | 50.2 | 50% | 101.8 | 6.7 | 57.0 | 56% | 103.3 | 6.7 | 63.7 | 62% | 104.7 | 6.7 | 70.4 | 67% | 106.2 | 6.7 | 77.1 | 73% | 107.7 | 6.7 | 83.9 | 78% | 107.7 | 79.1 | 83.9 | 78% |
| **TOTAL** | **4,968** | **265** | **2,935** | **59%** | **5,038** | **265** | **3,200** | **64%** | **5,108** | **265** | **3,465** | **68%** | **5,180** | **265** | **3,730** | **72%** | **5,252** | **265** | **3,995** | **76%** | **5,326** | **265** | **4,261** | **80%** | **5,326** | **3,618** | **4,261** | **80%** |
| **PILOT PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Huambo | 443.5 | 6.3 | 355.9 | 80% | 449.7 | 6.3 | 362.3 | 81% | 456.0 | 6.3 | 368.6 | 81% | 462.4 | 6.3 | 374.9 | 81% | 468.8 | 6.3 | 381.3 | 81% | 475.4 | 6.3 | 387.6 | 82% | 475.4 | 303.8 | 387.6 | 82% |
| Lunda Sul | 167.3 | 2.8 | 125.1 | 75% | 169.7 | 2.8 | 127.9 | 75% | 172.0 | 2.8 | 130.6 | 76% | 174.5 | 2.8 | 133.4 | 76% | 176.9 | 2.8 | 136.2 | 77% | 179.4 | 2.8 | 139.0 | 77% | 179.4 | 133.6 | 139.0 | 77% |
| Uige | 298.8 | 4.7 | 230.6 | 77% | 303.0 | 4.7 | 235.2 | 78% | 307.2 | 4.7 | 239.9 | 78% | 311.5 | 4.7 | 244.5 | 79% | 315.9 | 4.7 | 249.2 | 79% | 320.3 | 4.7 | 253.9 | 79% | 320.3 | 223.8 | 253.9 | 79% |
| **TOTAL** | **910** | **14** | **712** | **78%** | **922** | **14** | **725** | **79%** | **935** | **14** | **739** | **79%** | **948** | **14** | **753** | **79%** | **962** | **14** | **767** | **80%** | **975** | **14** | **780** | **80%** | **975** | **661** | **780** | **80%** |

*1. Results filtered for 372 rural comunas*
*2. Phase 1 pilot province*

## The Technology Mix

Climactic and geological conditions across Angola vary widely, and technologies used for acquiring water supply are similarly varied. From province to province, the technologies currently in use depend on the climate, topography, type of water source and other factors. Table 8.5 presents data on current technology types contained in the national water database, SISAS, filtered for the 372 participating *comunas* identified by DNA. As can be seen in the table, within this data set:

- 73% of water systems utilize groundwater sources, while 27% use surface water;
- Boreholes with handpumps represent 36% of all water supply solutions.
- Gravity flow systems comprise approximately 2% of all systems; and
- "Other" systems (those which do not utilize either handpumps or gravity flow as a means of extraction, implying some form of mechanized pumping generally) comprise about 53% of systems.

**Table 8.5: Existing technology types by province**

| | EXISTING ACCESS [1] | | | EXISTING TECHNOLOGY TYPES [1] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GROUNDWATER | | | | SURFACE WATER | | |
| | POP. 2009 | TOTAL ACCESS | | HP | GRAV. | OTHER | SUB-TOTAL | GRAV. | OTHER | SUB-TOTAL |
| PROVINCE | *NO.* | *NO.* | *%* | *%* | *%* | *%* | *%* | *%* | *%* | *%* |
| Bengo | 116.0 | 25.1 | **22%** | 38% | 0% | 6% | **44%** | 16% | 40% | **56%** |
| Benguela | 307.3 | 93.0 | **30%** | 12% | 12% | 64% | **88%** | 3% | 9% | **12%** |
| Bié | 425.7 | 56.2 | **13%** | 61% | 0% | 4% | **66%** | 1% | 33% | **34%** |
| Cabinda | 64.0 | 7.3 | **11%** | 0% | 61% | 30% | **91%** | 0% | 9% | **9%** |
| Cunene | 273.8 | 27.7 | **10%** | 92% | 0% | 4% | **96%** | 0% | 4% | **4%** |
| Huambo (2) | 375.3 | 83.8 | **22%** | 31% | 0% | 24% | **54%** | 20% | 25% | **46%** |
| Huila | 651.8 | 157.5 | **24%** | 58% | 13% | 28% | **99%** | 1% | 1% | **1%** |
| Kuando Kubango | 70.2 | 7.4 | **11%** | 7% | 0% | 0% | **7%** | 0% | 93% | **93%** |
| Kuanza Norte | 82.1 | 14.5 | **18%** | 15% | 32% | 6% | **53%** | 10% | 37% | **47%** |
| Kuanza Sul | 340.0 | 30.9 | **9%** | 3% | 11% | 45% | **59%** | 0% | 41% | **41%** |
| Luanda | 388.8 | 8.2 | **2%** | 0% | 0% | 100% | **100%** | 0% | 0% | **0%** |
| Lunda Norte | 233.6 | 24.5 | **10%** | 0% | 0% | 69% | **69%** | 0% | 31% | **31%** |
| Lunda Sul (2) | 141.6 | 5.4 | **4%** | 0% | 0% | 5% | **5%** | 0% | 95% | **95%** |
| Malanje | 259.9 | 24.0 | **9%** | 69% | 0% | 8% | **77%** | 0% | 23% | **23%** |
| Moxico | 91.3 | 25.8 | **28%** | 17% | 0% | 36% | **53%** | 0% | 47% | **47%** |
| Namibe | 45.4 | 17.1 | **38%** | 52% | 4% | 44% | **100%** | 0% | 0% | **0%** |
| Uige (2) | 252.9 | 30.1 | **12%** | 0% | 0% | 15% | **15%** | 11% | 74% | **85%** |
| Zaire | 85.0 | 4.7 | **6%** | 7% | 0% | 42% | **49%** | 8% | 42% | **51%** |
| TOTAL / AVG | 4,204.6 | 643.0 | **15%** | 36% | 7% | 31% | **73%** | 5% | 22% | **27%** |
| TOTAL PILOT PROV. | 1,018.5 | 117.2 | **12%** | 30% | 3% | 18% | **51%** | 3% | 46% | **49%** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

For the purposes of planning investments, Section 4 outlines the six most typical system types expected to be encountered under the NRWSSP, and estimates the capital and operational costs for each technology type.

Using the information presented in Table 8.5 – specifically, the existing technology ratios and the ratio of groundwater to surface water in each province within the current SISAS database – a suggested matrix of technology ratios anticipated under the NRWSSP is presented in Table 8.6, for the six identified technology types.

**Table 8.6: Projected technology types ratios by province (%)**

| PROVINCE | Borehole / Handpump | Borehole / solar pump / piped dist. | Borehole / electro-mechanical pump / piped dist. | Spring / gravity-fed / piped dist. | Spring / ram pump / piped dist. | Surface water / electromech. pump / treatment / piped dist. |
|---|---|---|---|---|---|---|
| Bengo | 34% | 7% | 4% | 35% | 17% | 3% |
| Benguela | 67% | 13% | 8% | 8% | 4% | 1% |
| Bié | 50% | 10% | 6% | 21% | 11% | 2% |
| Cabinda | 69% | 14% | 8% | 6% | 3% | 1% |
| Cunene | 73% | 15% | 8% | 2% | 1% | 0% |
| Huambo (2) | 41% | 8% | 5% | 29% | 14% | 3% |
| Huila | 75% | 15% | 9% | 1% | 0% | 0% |
| Kuando Kubango | 5% | 1% | 1% | 58% | 29% | 6% |
| Kuanza Norte | 40% | 8% | 5% | 29% | 15% | 3% |
| Kuanza Sul | 45% | 9% | 5% | 25% | 13% | 3% |
| Luanda | 75% | 15% | 9% | 1% | 0% | 0% |
| Lunda Norte | 52% | 10% | 6% | 20% | 10% | 2% |
| Lunda Sul (2) | 3% | 1% | 0% | 60% | 30% | 6% |
| Malanje | 58% | 12% | 7% | 14% | 7% | 1% |
| Moxico | 40% | 8% | 5% | 29% | 15% | 3% |
| Namibe | 75% | 15% | 9% | 1% | 0% | 0% |
| Uige (2) | 11% | 2% | 1% | 53% | 27% | 5% |
| Zaire | 37% | 7% | 4% | 32% | 16% | 3% |
| **TOTAL NRWSSP** | **56%** | **11%** | **6%** | **17%** | **8%** | **2%** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

Table 8.7 provides an estimate of residents provided with new access to water supply, by programme year and by technology type. Using an average number of users per technology type (see Annex B), the table also provides an estimate of the number of water systems to be constructed, totalling nearly 10,000 water systems expected to be constructed over the course of the programme in the 372 *comunas* identified for inclusion.

**Table 8.7: NRWSSP number of new users & number of systems by technology**

| YEAR | Borehole / handpump | Borehole / solar pump / piped dist. | Borehole / electromech. pump / piped dist. | Spring / gravity-fed / piped dist. | Spring / ram pump / piped dist. | Surface water / electromech. pump / treatment / piped dist. | TOTAL |
|---|---|---|---|---|---|---|---|
| **NEW USERS (x100B)** | | | | | | | |
| 2014 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2015 | 102.8 | 20.6 | 11.8 | 30.8 | 15.4 | 3.1 | 184.4 |
| 2016 | 176.4 | 35.3 | 20.2 | 52.8 | 26.4 | 5.3 | 316.2 |
| 2017 | 212.1 | 42.4 | 24.2 | 63.5 | 31.8 | 6.4 | 380.4 |
| 2018 | 226.7 | 45.3 | 25.9 | 67.9 | 33.9 | 6.8 | 406.5 |
| 2019 | 218.2 | 43.6 | 24.9 | 65.3 | 32.7 | 6.5 | 391.3 |
| 2020 | 194.2 | 38.8 | 22.2 | 58.1 | 29.1 | 5.8 | 348.3 |
| 2021 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| 2022 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| 2023 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| 2024 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| 2025 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| 2026 | 147.8 | 29.6 | 16.9 | 44.2 | 22.1 | 4.4 | 265.1 |
| **TOTAL USERS (x1000)** | **2,017.3** | **403.5** | **230.6** | **603.9** | **301.9** | **60.4** | **3,617.5** |
| **AVG. USERS / SYSTEM** | **250** | **650** | **2,200** | **950** | **950** | **1,950** | |
| **NO. OF SYSTEMS** | | | | | | | |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 411 | 32 | 5 | 32 | 16 | 2 | 498 |
| 2016 | 705 | 54 | 9 | 56 | 28 | 3 | 855 |
| 2017 | 849 | 65 | 11 | 67 | 33 | 3 | 1,028 |
| 2018 | 907 | 70 | 12 | 71 | 36 | 3 | 1,099 |
| 2019 | 873 | 67 | 11 | 69 | 34 | 3 | 1,058 |
| 2020 | 777 | 60 | 10 | 61 | 31 | 3 | 942 |
| 2021 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| 2022 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| 2023 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| 2024 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| 2025 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| 2026 | 591 | 45 | 8 | 47 | 23 | 2 | 717 |
| **TOTAL NO. SYSTEMS** | **8,069** | **621** | **105** | **636** | **318** | **31** | **9,779** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

### 8.1.2 Capital investment costs

**Unit costs**

Typical capital unit costs for the six technology types are developed in Section 4. For the purposes of estimating to the provincial and *comuna* level, these typical unit costs were weighted for each province according to the expected technology ratios presented in Table 8.6. The resulting province-specific unit costs are presented in Table 8.8 and are used in the following sections for estimating infrastructure costs.

**Table 8.8: Unit costs for water supply capital investment, adjusted by province (USD)**

| PROVINCE | TECHNOLOGY RATIOS | | | | | | BLENDED UNIT COST | |
|---|---|---|---|---|---|---|---|---|
| | Borehole / handpump | Borehole / solar pump / piped dist. | Borehole / electromech. pump / piped dist. | Spring / gravity-fed / piped dist. | Spring / ram pump / piped dist. | Surface water / electromech. pump / treatment / piped dist. | CAPITAL COST PER PERSON | CAPITAL COST PER SYSTEM |
| **AVERAGE UNIT COST** | **68.45** | **68.45** | **68.45** | **117.78** | **117.78** | **117.78** | | |
| Bengo | 34% | 7% | 4% | 35% | 17% | 3% | **108.25** | **81,800** |
| Benguela | 67% | 13% | 8% | 8% | 4% | 1% | **92.93** | **61,000** |
| Bié | 50% | 10% | 6% | 21% | 11% | 2% | **100.64** | **71,400** |
| Cabinda | 69% | 14% | 8% | 6% | 3% | 1% | **91.69** | **59,300** |
| Cunene | 73% | 15% | 8% | 2% | 1% | 0% | **89.80** | **56,700** |
| Huambo (2) | 41% | 8% | 5% | 29% | 14% | 3% | **104.72** | **77,000** |
| Huila | 75% | 15% | 9% | 1% | 0% | 0% | **89.00** | **55,600** |
| Kuando Kubango | 5% | 1% | 1% | 58% | 29% | 6% | **121.62** | **99,900** |
| Kuanza Norte | 40% | 8% | 5% | 29% | 15% | 3% | **105.25** | **77,700** |
| Kuanza Sul | 45% | 9% | 5% | 25% | 13% | 3% | **102.99** | **74,600** |
| Luanda | 75% | 15% | 9% | 1% | 0% | 0% | **88.87** | **55,500** |
| Lunda Norte | 52% | 10% | 6% | 20% | 10% | 2% | **99.59** | **70,000** |
| Lunda Sul (2) | 3% | 1% | 0% | 60% | 30% | 6% | **122.40** | **101,000** |
| Malanje | 58% | 12% | 7% | 14% | 7% | 1% | **96.72** | **66,100** |
| Moxico | 40% | 8% | 5% | 29% | 15% | 3% | **105.17** | **77,600** |
| Namibe | 75% | 15% | 9% | 1% | 0% | 0% | **88.87** | **55,500** |
| Uige (2) | 11% | 2% | 1% | 53% | 27% | 5% | **118.66** | **95,900** |
| Zaire | 37% | 7% | 4% | 32% | 16% | 3% | **106.53** | **79,400** |
| TOTAL | 56% | 11% | 6% | 17% | 8% | 2% | **98.00** | **67,800** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

## Cost estimate

Capital costs for new water supply services are estimated based on:

- Population growth estimates and national targets for water supply coverage shown in Table 8.4; and
- Unit costs for capital investment presented in Table 8.8.

Capital investment in the construction of new water systems for a total of 3.618M new users is estimated to total USD 433.7M, as summarized in Table 8.9 showing both annual and cumulative investment requirements. The table also summarizes programme beneficiaries (residents benefiting from new water services), as follows:

- Phase 1 (2014 – 2018): USD 143.5M, benefiting a total of 1.288M new users;
- Phase 2 (2019 – 2022): USD 149.7M, benefiting a total of 1.270M new users; and
- Phase 3 (2023 – 2026): USD 140.5M, benefiting a total of 1.060M new users.

**Table 8.9: Capital investment in water supply services and new users - NRWSSP (USDx1000)**

| PROVINCE | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COST BY PROVINCE** | | | | | | | | | | | | | |
| Bengo | 422 | 651 | 838 | 1,094 | 1,305 | 1,344 | 1,070 | 1,102 | 1,135 | 1,169 | 1,204 | 1,240 | **12,571** |
| Benguela | 884 | 1,367 | 1,759 | 2,295 | 2,738 | 2,820 | 2,244 | 2,312 | 2,381 | 2,452 | 2,526 | 2,602 | **26,380** |
| Bié | 1,545 | 2,388 | 3,074 | 4,011 | 4,783 | 4,927 | 3,921 | 4,039 | 4,160 | 4,285 | 4,413 | 4,546 | **46,090** |
| Cabinda | 215 | 332 | 428 | 558 | 665 | 685 | 546 | 562 | 579 | 596 | 614 | 632 | **6,413** |
| Cunene | 910 | 1,405 | 1,809 | 2,361 | 2,815 | 2,900 | 2,308 | 2,377 | 2,449 | 2,522 | 2,598 | 2,676 | **27,129** |
| Huambo (2) | 3,277 | 7,088 | 8,343 | 6,803 | 3,688 | 1,330 | 815 | 840 | 865 | 891 | 917 | 945 | **35,801** |
| Huila | 1,903 | 2,940 | 3,785 | 4,938 | 5,890 | 6,066 | 4,828 | 4,973 | 5,122 | 5,276 | 5,434 | 5,597 | **56,752** |
| Kuando Kubango | 315 | 486 | 626 | 816 | 974 | 1,003 | 798 | 822 | 847 | 872 | 898 | 925 | **9,382** |
| Kuanza Norte | 300 | 464 | 598 | 780 | 930 | 958 | 762 | 785 | 809 | 833 | 858 | 884 | **8,961** |
| Kuanza Sul | 1,306 | 2,018 | 2,598 | 3,389 | 4,042 | 4,163 | 3,314 | 3,413 | 3,515 | 3,621 | 3,730 | 3,841 | **38,950** |
| Luanda | 1,361 | 2,103 | 2,707 | 3,532 | 4,212 | 4,339 | 3,453 | 3,557 | 3,663 | 3,773 | 3,886 | 4,003 | **40,589** |
| Lunda Norte | 858 | 1,326 | 1,707 | 2,227 | 2,656 | 2,735 | 2,177 | 2,242 | 2,310 | 2,379 | 2,450 | 2,524 | **25,591** |
| Lunda Sul (2) | 1,685 | 3,644 | 4,290 | 3,498 | 1,896 | 684 | 419 | 432 | 445 | 458 | 472 | 486 | **18,408** |
| Malanje | 936 | 1,447 | 1,863 | 2,430 | 2,898 | 2,985 | 2,376 | 2,447 | 2,521 | 2,596 | 2,674 | 2,755 | **27,929** |
| Moxico | 303 | 469 | 603 | 787 | 939 | 967 | 769 | 793 | 816 | 841 | 866 | 892 | **9,044** |
| Namibe | 116 | 179 | 231 | 301 | 359 | 370 | 294 | 303 | 312 | 322 | 331 | 341 | **3,460** |
| Uige (2) | 2,735 | 5,916 | 6,964 | 5,679 | 3,079 | 1,110 | 680 | 701 | 722 | 744 | 766 | 789 | **29,884** |
| Zaire | 347 | 537 | 691 | 901 | 1,075 | 1,107 | 881 | 908 | 935 | 963 | 992 | 1,022 | **10,358** |
| **TOTAL (USD)** | **19,418** | **34,758** | **42,914** | **46,400** | **44,943** | **40,491** | **31,657** | **32,606** | **33,584** | **34,592** | **35,630** | **36,699** | **433,692** |
| **COST BY PHASE** | | | | | | | | | | | | | |
| Phase 1 | 19,418 | 34,758 | 42,914 | 46,400 | | | | | | | | | **143,491** |
| Phase 2 | | | | | 44,943 | 40,491 | 31,657 | 32,606 | | | | | **149,697** |
| Phase 3 | | | | | | | | | 33,584 | 34,592 | 35,630 | 36,699 | **140,505** |
| **CUM. TOTAL (USD)** | **19,418** | **54,177** | **97,090** | **143,491** | **188,433** | **228,925** | **260,581** | **293,188** | **326,772** | **361,364** | **396,994** | **433,692** | **433,692** |
| **NEW USERS BY PHASE (x 1000 USERS)** | | | | | | | | | | | | | |
| Phase 1 | 184 | 316 | 380 | 406 | | | | | | | | | **1,288** |
| Phase 2 | | | | | 391 | 348 | 265 | 265 | | | | | **1,270** |
| Phase 3 | | | | | | | | | 265 | 265 | 265 | 265 | **1,060** |
| **CUM. NEW USERS** | **184** | **501** | **881** | **1,288** | **1,679** | **2,027** | **2,292** | **2,557** | **2,822** | **3,087** | **3,352** | **3,618** | **3,618** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

*3. Costs subject to 3% annual inflation.*

Annex B2 provides detailed calculations used to generate this total for each of the 372 comunas included in the plan.

It is important to note that this estimate is for new services only. It is however expected that the NRWSSP will support the rehabilitation of existing water systems where this is found to be appropriate. An allowance for the rehabilitation of existing dysfunctional or non-functional systems is included separately in the overall Programme budget.

### 8.1.3 Operation & maintenance costs

The major portion of water system operation and maintenance costs will be the responsibility of beneficiary rural communities and is not included in estimates for investment. A 30% portion of capital maintenance has however been assigned as infrastructure investment (see Annex C), and for this reason – as well as for the purpose providing further context – all O&M costs, whether included in the NRWSSP investment, have been estimated in this report.

**Unit costs**

The O&M unit costs for the six technology types developed in Section 4 were weighted for each province according to the expected technology ratios presented in Table 8.6. The resulting province-specific unit costs are presented in Table 8.10.

**Cost estimate**

O&M costs for new water supply services are estimated based on:

- Total users with services per year as estimated in Table 8.4; and
- Unit costs for water system O&M presented in Table 8.10.

Table 8.11 shows O&M costs (for the 372 *comunas* selected for inclusion in the NRWSSP) rising from an estimated USD 1.9M per year in 2014 to USD 17.8M in 2026 as new services expand the total number of residents served. Over the 12-year span, the value of O&M costs is estimated at USD 120.9M, as follows:

- Phase 1 (2014 – 2018): USD 19.2M;
- Phase 2 (2019 – 2022): USD 39.8M; and
- Phase 3 (2023 – 2026): USD 61.9M

Annex B3 provides detailed calculations of O&M costs by *comuna* and by programme year.

**Table 8.10: Unit costs for water supply operation & maintenance (USD)**

| PROVINCE | TECHNOLOGY RATIOS | | | | | | BLENDED UNIT COST |
|---|---|---|---|---|---|---|---|
| | Borehole / handpump | Borehole / solar pump / piped dist. | Borehole / electromech. pump / piped dist. | Spring / gravity-fed / piped dist. | Spring / ram pump / piped dist. | Surface water / electromech. pump / treatment / piped dist. | |
| **AVERAGE UNIT COST** | **1.78** | **5.11** | **7.90** | **2.23** | **2.23** | **17.36** | |
| Bengo | 34% | 7% | 4% | 35% | 17% | 3% | **3.02** |
| Benguela | 67% | 13% | 8% | 8% | 4% | 1% | **2.86** |
| Bié | 50% | 10% | 6% | 21% | 11% | 2% | **2.94** |
| Cabinda | 69% | 14% | 8% | 6% | 3% | 1% | **2.85** |
| Cunene | 73% | 15% | 8% | 2% | 1% | 0% | **2.83** |
| Huambo (2) | 41% | 8% | 5% | 29% | 14% | 3% | **2.98** |
| Huila | 75% | 15% | 9% | 1% | 0% | 0% | **2.82** |
| Kuando Kubango | 5% | 1% | 1% | 58% | 29% | 6% | **3.15** |
| Kuanza Norte | 40% | 8% | 5% | 29% | 15% | 3% | **2.99** |
| Kuanza Sul | 45% | 9% | 5% | 25% | 13% | 3% | **2.96** |
| Luanda | 75% | 15% | 9% | 1% | 0% | 0% | **2.82** |
| Lunda Norte | 52% | 10% | 6% | 20% | 10% | 2% | **2.93** |
| Lunda Sul (2) | 3% | 1% | 0% | 60% | 30% | 6% | **3.16** |
| Malanje | 58% | 12% | 7% | 14% | 7% | 1% | **2.90** |
| Moxico | 40% | 8% | 5% | 29% | 15% | 3% | **2.99** |
| Namibe | 75% | 15% | 9% | 1% | 0% | 0% | **2.82** |
| Uige (2) | 11% | 2% | 1% | 53% | 27% | 5% | **3.12** |
| Zaire | 37% | 7% | 4% | 32% | 16% | 3% | **3.00** |
| **TOTAL** | **56%** | **11%** | **6%** | **17%** | **8%** | **2%** | **2.91** |
| **TOTAL PILOT PROV.** | **32%** | **6%** | **4%** | **36%** | **18%** | **4%** | **3.03** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

## 8.2 Sanitation & hygiene promotion

### 8.2.1 Inputs

Sanitation and hygiene promotion will be conducted using Community-Led Total Sanitation in combination with sanitation marketing. Within this model, the household is responsible for constructing their own sanitation infrastructure. No subsidies are provided. Therefore the cost of the sanitation and hygiene component of the NRWSSP consists of the inputs required to mobilize communities to change their behaviours and to sustain those changes. The NRWSSP will cover costs related to implementation of the sanitation and hygiene component over its three phases, including:

- per diems, transportation, communication and related travel costs for government personnel;
- consultant fees and expenses (communications, STLC and sanitation marketing consultants for a total of 66 person months);
- national and provincial awareness campaigns for policy-makers and key stakeholders;
- national, provincial and municipal meetings and planning and evaluation workshops;

- training workshops and materials (provincial, municipal and *comuna* ODF committees, municipal facilitators, latrine masons, demonstration centre management, public latrine operators, schools, and community activists);
- manuals, tools and facilitation materials;
- salary of one municipal coordinator per municipality for two years, after which time the municipal government will continue to pay the salary;
- salary and equipment for three municipal facilitators per municipality for four years;
- one vehicle per province and related maintenance expenses;
- one vehicle per municipality and related maintenance expenses;
- provincial and municipal experience exchanges; and
- one sanitation demonstration centre and two public latrines per municipality.

Staff salaries will not be covered by the programme for existing personnel. Costs related to the PMU, its personnel and expenses are not included in the sanitation and hygiene component cost.

### 8.2.2 Cost estimate

The cost of the sanitation and hygiene component is based on unit costs from similar work in Angola[43], and totals USD 111.9M over 12 years. Table 8.12 presents estimated costs related to this component over the duration of the national programme, as follows:

- Phase 1 (2014 – 2018): USD 12.1M;
- Phase 2 (2019 – 2022): USD 71.9M; and
- Phase 3 (2023 – 2026: USD 27.9M.

Detailed calculations for sanitation and hygiene promotion are provided in Annex B4 by *comuna* and by programme year.

[43] Baptista, E. (2014). Personal Communication; and, Cowater International Inc. (2014). Financial records.

**Table 8.11: Community operation & maintenance costs for water supply services - NRWSSP (USDx1000)**

| PROVINCE | O&M UNIT COST, 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL BY PROVINCE** | | | | | | | | | | | | | | |
| Bengo | 3.02 | 90 | 111 | 137 | 172 | 213 | 257 | 295 | 334 | 376 | 420 | 466 | 514 | 3,461 |
| Benguela | 2.86 | 302 | 353 | 418 | 501 | 600 | 705 | 795 | 890 | 990 | 1,096 | 1,206 | 1,323 | 9,445 |
| Bié | 2.94 | 215 | 292 | 390 | 519 | 674 | 839 | 978 | 1,126 | 1,281 | 1,445 | 1,617 | 1,798 | 11,338 |
| Cabinda | 2.85 | 28 | 39 | 54 | 73 | 96 | 120 | 140 | 162 | 185 | 209 | 234 | 261 | 1,620 |
| Cunene | 2.83 | 109 | 157 | 219 | 300 | 397 | 501 | 589 | 681 | 779 | 882 | 990 | 1,104 | 6,786 |
| Huambo (2) | 2.98 | 351 | 563 | 817 | 1,036 | 1,172 | 1,245 | 1,305 | 1,368 | 1,434 | 1,502 | 1,574 | 1,648 | 14,264 |
| Huila | 2.82 | 518 | 627 | 766 | 946 | 1,161 | 1,388 | 1,583 | 1,788 | 2,005 | 2,232 | 2,471 | 2,723 | 18,655 |
| Kuando Kubango | 3.15 | 32 | 46 | 63 | 87 | 114 | 144 | 169 | 195 | 223 | 252 | 283 | 316 | 1,947 |
| Kuanza Norte | 2.99 | 53 | 68 | 87 | 111 | 141 | 173 | 199 | 228 | 258 | 289 | 322 | 357 | 2,328 |
| Kuanza Sul | 2.96 | 132 | 194 | 275 | 380 | 508 | 643 | 758 | 879 | 1,006 | 1,141 | 1,282 | 1,431 | 8,721 |
| Luanda | 2.82 | 67 | 136 | 226 | 345 | 489 | 641 | 770 | 906 | 1,050 | 1,201 | 1,360 | 1,528 | 8,741 |
| Lunda Norte | 2.93 | 99 | 141 | 196 | 267 | 353 | 444 | 521 | 603 | 689 | 780 | 875 | 976 | 6,016 |
| Lunda Sul (2) | 3.16 | 61 | 157 | 272 | 371 | 431 | 461 | 486 | 512 | 539 | 567 | 596 | 626 | 5,095 |
| Malanje | 2.90 | 100 | 146 | 206 | 286 | 381 | 482 | 568 | 658 | 754 | 854 | 960 | 1,071 | 6,536 |
| Moxico | 2.99 | 88 | 104 | 124 | 150 | 181 | 214 | 243 | 272 | 304 | 337 | 371 | 408 | 2,873 |
| Namibe | 2.82 | 53 | 61 | 70 | 82 | 95 | 110 | 123 | 136 | 150 | 165 | 180 | 196 | 1,469 |
| Uige (2) | 3.12 | 169 | 329 | 523 | 688 | 789 | 842 | 885 | 930 | 977 | 1,026 | 1,077 | 1,130 | 9,459 |
| Zaire | 3.00 | 24 | 40 | 61 | 88 | 121 | 156 | 185 | 216 | 249 | 284 | 320 | 359 | 2,119 |
| **TOTAL (USD)** | | **2,492** | **3,563** | **4,903** | **6,399** | **7,918** | **9,365** | **10,593** | **11,886** | **13,247** | **14,680** | **16,186** | **17,769** | **120,874** |
| **TOTAL BY PHASE** | | | | | | | | | | | | | | |
| Phase 1 | | 2,492 | 3,563 | 4,903 | 6,399 | | | | | | | | | 19,230 |
| Phase 2 | | | | | | 7,918 | 9,365 | 10,593 | 11,886 | | | | | 39,761 |
| Phase 3 | | | | | | | | | | 13,247 | 14,680 | 16,186 | 17,769 | 61,882 |
| **CUM. TOTAL (USD)** | | **4,365** | **7,928** | **12,831** | **19,230** | **27,148** | **36,513** | **47,106** | **58,992** | **72,239** | **86,918** | **103,104** | **120,874** | **120,874** |

*1. Results filtered for 372 rural comunas*

*2. Phase 1 pilot province*

*3. Costs subject to 3% annual inflation.*

**Table 8.12: Sanitation & hygiene promotion costs - NRWSSP (USDx1000)**

| PROVINCE | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NATIONAL LEVEL** | | | | | | | | | | | | | |
| **Personnel expense** | | | | | | | | | | | | | |
| Per diems | 9 | 10 | 5 | 5 | 13 | 10 | 7 | 6 | 5 | 5 | 5 | 5 | **83** |
| Domestic travel | 10 | 11 | 5 | 6 | 14 | 11 | 7 | 6 | 5 | 5 | 6 | 6 | **92** |
| Communications | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | **18** |
| **Other expenses** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Consultant fees & expenses | 766 | 629 | 329 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1,725** |
| Workshops - national level | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **7** |
| Workshops - all provinces | 21 | 21 | 22 | 23 | 23 | 24 | 25 | 25 | 26 | 27 | 28 | 29 | **292** |
| Awareness campaign & matls | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **10** |
| Workshops - latrine design | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **6** |
| **SUBTOTAL** | **831** | **672** | **363** | **35** | **51** | **46** | **40** | **39** | **38** | **39** | **40** | **41** | **2,233** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | |
| Year 1 provinces | 360 | 167 | 150 | 124 | 106 | 91 | 112 | 97 | 119 | 102 | 126 | 109 | **1,663** |
| Year 5 provinces - 5 per year | 0 | 0 | 0 | 0 | 2,025 | 939 | 845 | 699 | 595 | 512 | 631 | 543 | **6,790** |
| **SUBTOTAL** | **360** | **167** | **150** | **124** | **2,131** | **1,030** | **957** | **796** | **714** | **614** | **757** | **652** | **8,452** |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | |
| Year 1 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Year 2 municipalities | 0 | 2,571 | 1,284 | 1,065 | 1,013 | 348 | 329 | 369 | 349 | 392 | 370 | 416 | **8,506** |
| Year 3 municipalities | 0 | 0 | 1,765 | 882 | 731 | 696 | 239 | 226 | 254 | 240 | 269 | 254 | **5,555** |
| Year 4 municipalities | 0 | 0 | 0 | 1,818 | 908 | 753 | 716 | 246 | 233 | 261 | 247 | 277 | **5,460** |
| Year 5 municipalities | 0 | 0 | 0 | 0 | 14,513 | 7,249 | 6,010 | 5,719 | 1,966 | 1,858 | 2,085 | 1,971 | **41,372** |
| Year 6 municipalities | 0 | 0 | 0 | 0 | 0 | 11,091 | 5,540 | 4,593 | 4,371 | 1,502 | 1,420 | 1,594 | **30,110** |
| Year 7 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 2,980 | 1,489 | 1,234 | 1,174 | 404 | 382 | **7,662** |
| Year 8 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,023 | 511 | 424 | 403 | 139 | **2,500** |
| **SUBTOTAL** | **0** | **2,571** | **3,049** | **3,764** | **17,165** | **20,137** | **15,815** | **13,666** | **8,917** | **5,851** | **5,199** | **5,032** | **101,166** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | |
| **TOTAL (USD)** | **1,191** | **3,409** | **3,562** | **3,923** | **19,347** | **21,212** | **16,812** | **14,500** | **9,669** | **6,504** | **5,996** | **5,725** | **111,851** |

| **TOTAL BY PHASE** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase 1 | 1,191 | 3,409 | 3,562 | 3,923 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **12,086** |
| Phase 2 | 0 | 0 | 0 | 0 | 19,347 | 21,212 | 16,812 | 14,500 | 0 | 0 | 0 | 0 | **71,871** |
| Phase 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,669 | 6,504 | 5,996 | 5,725 | **27,894** |
| **CUM. TOTAL (USD)** | **1,191** | **4,600** | **8,162** | **12,086** | **31,433** | **52,645** | **69,457** | **83,957** | **93,625** | **100,130** | **106,126** | **111,851** | **111,851** |

*Costs subject to 3% annual inflation.*

## 8.3 Capacity building and training

### 8.3.1 Inputs

The Human Resources Development Strategy for the NRWSSP focuses on strengthening provincial and municipal level departments and other stakeholders responsible for implementation of rural water supply and sanitation projects. Beginning on a pilot basis in Uige, Huambo and Lunda Sul capacity building will gradually increase to respond to increasing program scope, activity and increased responsibilities of key actors. Costs related to this component include:

- Functional capacity building at national level (planning and policy development, monitoring, communications, standards preparation process, internal guidelines/procedures preparation);
- Coordination & communications (stakeholder for a, technical & sector reviews, Provincial Oversight Group);
- Pilot activities & lessons learned (evaluations, publications, dissemination, study tours, official visits);
- Training institutions (IFAL, Onga Zanga, universities and technical schools, NGOs and private sector, international organizations, in-house training);
- Equipment & facilities (GPS/GIS training and other as needed);
- Informal Capacity Building at national, provincial and municipal levels (study tours, short-term staff exchanges, mentoring); and
- Training of private sector / NGO contractors or service providers (e.g. mechanics & artisans) on the NRWSSP, technical and administrative issues, community mobilisation, MoGeCA, cross-cutting issues, and others.

### 8.3.2 Cost estimate

The cost of the Capacity Building component totals USD 47.1M over 12 years. Table 8.13 presents estimated costs related to this component over the duration of the national programme, as follows:

- Phase 1 (2014 – 2018): USD 13.6M;
- Phase 2 (2019 – 2022): USD 24.9M; and
- Phase 3 (2023 – 2026): USD 8.6M.

Detailed calculations for capacity building promotion are provided in Annex B5.

**Table 8.13: Capacity building component costs - NRWSSP (USDx1000)**

| PROVINCE | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NATIONAL LEVEL** | | | | | | | | | | | | | |
| Functional Capacity Building | 139 | 186 | 104 | 191 | 151 | 281 | 289 | 203 | 0 | 0 | 0 | 0 | **1,543** |
| NRWSSP Staff Training | 93 | 350 | 492 | 642 | 487 | 358 | 295 | 304 | 0 | 0 | 0 | 0 | **3,020** |
| Coordination & Communications | 78 | 128 | 160 | 192 | 140 | 144 | 149 | 185 | 92 | 61 | 63 | 65 | **1,458** |
| Pilot Activities & Lessons Learned | 309 | 647 | 634 | 934 | 614 | 531 | 547 | 956 | 111 | 114 | 118 | 513 | **6,030** |
| Equipment & Facilities | 243 | 547 | 935 | 1,198 | 1,595 | 1,870 | 1,869 | 1,887 | 1,451 | 1,494 | 1,539 | 1,514 | **16,144** |
| Informal Capacity Building | 8 | 11 | 9 | 11 | 9 | 12 | 10 | 13 | 0 | 0 | 0 | 0 | **91** |
| **SUBTOTAL** | **870** | **2,166** | **2,879** | **3,770** | **3,739** | **3,889** | **3,713** | **3,954** | **1,758** | **1,777** | **1,831** | **2,206** | **32,561** |
| **PROVINCIAL LEVEL (3)** | | | | | | | | | | | | | |
| Functional Capacity Building | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Coordination & Communications | 91 | 166 | 170 | 176 | 533 | 693 | 713 | 735 | 261 | 269 | 277 | 228 | **4,311** |
| Equipment & Facilities | 29 | 21 | 31 | 23 | 79 | 119 | 133 | 127 | 0 | 0 | 0 | 0 | **569** |
| Private Sector & NGOs (per plan) | 535 | 551 | 567 | 876 | 1,805 | 1,859 | 957 | 493 | 0 | 0 | 0 | 0 | **7,643** |
| Informal Capacity Building | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Service Providers (per plan) | 112 | 115 | 119 | 326 | 420 | 433 | 357 | 184 | 0 | 0 | 0 | 0 | **2,066** |
| **SUBTOTAL** | **766** | **853** | **887** | **1,401** | **2,837** | **3,104** | **2,160** | **1,538** | **261** | **269** | **277** | **228** | **14,589** |
| **MUNICIPAL LEVEL (3)** | | | | | | | | | | | | | |
| Active municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Equipment & Facilities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Informal Capacity Building | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **SUBTOTAL** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | |
| **TOTAL (USD)** | **1,636** | **3,019** | **3,766** | **5,171** | **6,576** | **6,993** | **5,873** | **5,492** | **2,019** | **2,046** | **2,107** | **2,434** | **47,150** |

| **COST BY PHASE** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase 1 | 1,636 | 3,019 | 3,766 | 5,171 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **13,608** |
| Phase 2 | 0 | 0 | 0 | 0 | 6,576 | 6,993 | 5,873 | 5,492 | 0 | 0 | 0 | 0 | **24,934** |
| Phase 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,019 | 2,046 | 2,107 | 2,434 | **8,607** |
| **CUM. TOTAL (USD)** | **1,652** | **4,671** | **8,437** | **13,608** | **20,184** | **27,177** | **33,051** | **38,542** | **40,562** | **42,608** | **44,715** | **47,150** | **47,150** |

*1. Costs subject to 3% annual inflation.*

*2. PMU cost (personnel time, expenses) not included.*

*3. Training activities for all levels are budgeted at national level, except for training provided to private sector (see "Provincial" section above). Final budgets to be based upon capacity building plans developed over the course of the Programme. Values presented in this table should therefore be considered estimates.*

## 8.4 Monitoring and reporting

### 8.4.1 Inputs

The cost of the monitoring and reporting component of the NRWSSP consists of the inputs required to develop, implement and sustain a new sector monitoring framework, including a joint sector review and planning process using the data collected. It also includes the costs related to development of an M&R system for maintenance and repair. The NRWSSP will cover costs related to implementation of the M&R component over its three phases, including:

- per diems, transportation, communication and related travel costs for government personnel;
- consultant fees and expenses (M&R consultant for a total of 30 person months);
- national, provincial and municipal meetings and planning and evaluation workshops;
- sector working group meetings and annual joint sector review;
- training workshops and materials (national, provincial, municipal and *comuna* levels);
- manuals, tools and facilitation materials;
- salary of one municipal M&R coordinator per municipality for two years, after which time the municipal government will continue to pay the salary;
- salary of one provincial M&R coordinator per province for two years, after which time the municipal government will continue to pay the salary;
- one vehicle per province and related maintenance expenses;
- one vehicle per municipality and related maintenance expenses;
- some equipment and software at each level;
- development and implementation of a mobile-phone based mapping platform in each province and at the national level; and
- a baseline survey (ICT-based) in each province.

Staff salaries will not be covered by the programme for existing personnel. Costs related to the PMU, its personnel and expenses are not included in the M&R component cost.

### 8.4.2 Cost estimate

The cost of the M&R component is based on unit costs from similar work in Angola[44], and totals USD 54.9M over 12 years. Table 8.12 presents estimated costs related to this component over the duration of the national programme, as follows:

- Phase 1 (2014-2018): USD 5.5M;
- Phase 2 (2019 – 2022): USD 32.5M; and
- Phase 3 (2023 – 2026): USD 16.8M.

Detailed calculations for monitoring and reporting are provided in Annex B6.

[44] Baptista, C. (2014). Personal Communication; and, Cowater International Inc. (2014). Financial records.

**Table 8.14: Monitoring & reporting costs - NRWSSP (USDx1000)**

| DESCRIPTION | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NATIONAL LEVEL** | | | | | | | | | | | | | |
| **Personnel expenses** | | | | | | | | | | | | | |
| Per diems | 8 | 7 | 5 | 2 | 13 | 13 | 7 | 2 | 2 | 2 | 2 | 3 | 66 |
| Domestic travel | 9 | 7 | 5 | 2 | 14 | 14 | 7 | 3 | 3 | 3 | 3 | 3 | 73 |
| Communications | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 18 |
| Consultant fees & expenses | 306 | 318 | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 789 |
| **Other expenses** | | | | | | | | | | | | | |
| Sector working group meetings | 14 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 62 |
| Workshops | 24 | 18 | 11 | 11 | 19 | 12 | 12 | 13 | 13 | 13 | 14 | 14 | 175 |
| Annual report (prod./dissem.) | 0 | 8 | 8 | 8 | 9 | 9 | 9 | 10 | 10 | 10 | 10 | 11 | 102 |
| Tools & manuals | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Equipment & software | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| Mobile-phone based mapping | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| **SUBTOTAL** | **386** | **363** | **200** | **29** | **60** | **54** | **41** | **33** | **34** | **35** | **36** | **37** | **1,307** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | |
| Year 1 provinces | 420 | 183 | 141 | 103 | 53 | 54 | 56 | 57 | 59 | 61 | 63 | 65 | 1,315 |
| Year 5 provinces | 0 | 0 | 0 | 0 | 2,365 | 1,030 | 795 | 580 | 296 | 304 | 314 | 323 | 6,006 |
| **SUBTOTAL** | **420** | **183** | **141** | **103** | **2,417** | **1,084** | **851** | **637** | **355** | **365** | **376** | **388** | **7,320** |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | |
| Year 1 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Year 2 municipalities | 0 | 923 | 625 | 412 | 424 | 235 | 242 | 249 | 257 | 264 | 272 | 281 | 4,185 |
| Year 3 municipalities | 0 | 0 | 634 | 429 | 283 | 291 | 161 | 166 | 171 | 176 | 182 | 187 | 2,681 |
| Year 4 municipalities | 0 | 0 | 0 | 653 | 442 | 291 | 300 | 166 | 171 | 176 | 182 | 187 | 2,569 |
| Year 5 municipalities | 0 | 0 | 0 | 0 | 5,211 | 3,531 | 2,326 | 2,395 | 1,327 | 1,366 | 1,407 | 1,450 | 19,014 |
| Year 6 municipalities | 0 | 0 | 0 | 0 | 0 | 3,982 | 2,699 | 1,777 | 1,831 | 1,014 | 1,044 | 1,076 | 13,422 |
| Year 7 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 1,070 | 725 | 478 | 492 | 272 | 281 | 3,318 |
| Year 8 municipalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 367 | 249 | 164 | 169 | 94 | 1,043 |
| **SUBTOTAL** | **0** | **923** | **1,259** | **1,494** | **6,360** | **8,331** | **6,798** | **5,847** | **4,483** | **3,653** | **3,529** | **3,554** | **46,232** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | |
| **TOTAL (USD)** | **807** | **1,469** | **1,600** | **1,626** | **8,838** | **9,469** | **7,690** | **6,517** | **4,872** | **4,054** | **3,941** | **3,979** | **54,860** |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL BY PHASE** | | | | | | | | | | | | | |
| Phase 1 | 807 | 1,469 | 1,600 | 1,626 | | | | | | | | | **5,502** |
| Phase 2 | | | | | 8,838 | 9,469 | 7,690 | 6,517 | | | | | **32,513** |
| Phase 3 | | | | | | | | | 4,872 | 4,054 | 3,941 | 3,979 | **16,845** |
| **CUM. TOTAL (USD)** | **807** | **2,275** | **3,875** | **5,502** | **14,339** | **23,808** | **31,498** | **38,015** | **42,886** | **46,940** | **50,881** | **54,860** | **54,860** |

*Costs subject to 3% annual inflation.*

## 8.5 Programme management

### 8.5.1 Inputs

The primary programme management components include the following: (i) staff salaries; (ii) other staff-related items; (iii) office equipment and furnishings; (iv) field staff equipment (including vehicles); and (v) recurrent operational costs. Key provisions of the programme management arrangements for the NRWSSP include:

- Gradual reductions in Programme payments of municipal staffing expenses over time;
- Secondments of government staff to the Programme at both the national and provincial levels;
- Upgrading of office space and connectivity, along with the provision of required transportation at the provincial and municipal levels;
- The modification at the start of Phase 2 of the NRWSSP whereby the three provincial Programme support offices become four regional support offices; and
- Elimination of Programme subsidies and payments for administrative expenditures at the provincial and municipal levels during the NRWSSP Phase 3, by which time all primary stakeholders will assume their mandated sector roles, financed through the regular, national budgeting process.

At the end of the second and fourth years of Programme implementation these proposed approaches should be reviewed to ensure that the NRWSSP maintains its capacity to deliver sustainable WASH solutions. There may be a need to extend in some cases Programme subsidies at the municipal level due to the fact that the NRWSSP does not control or influence national policy development or annual national budget allocations that may fluctuate or alter course unexpectedly.

### 8.5.2 Cost estimate

Programme management costs total USD 201.1M over 12 years. Table 8.15 presents estimated costs related to this component over the duration of the national programme, as follows:

- Phase 1 (2014 – 2018): USD 38.7M;
- Phase 2 (2019 – 2022): USD 151.6M; and
- Phase 3 (2023 – 2026: USD 10.8M.

Cost estimates are presented for the national, provincial, and municipal levels. Detailed calculations for programme management are provided in Annex B7.

## 8.6 Summary of NRWSSP investments

The NRWSSP will provide new water supply services for an estimated total of 3.618M rural residents over the 12 year period in the 372 comunas identified for inclusion in the investment plan. In these locations, coverage in water supply services will rise from 14% to 41% by the end of Phase 1 in 2018 and to 80% by the end of the programme in 2026.

Overall programme costs are estimated at USD 1013.5M (present value: USD 471.8M) over this period. Table 8.16 summarizes all cost estimates for capital investment, sanitation & hygiene promotion, capacity building, monitoring & reporting costs, as well as programme management. The table also summarizes projections for annual and cumulative programme beneficiaries. Projected costs are expressed in future and present values, using a discount rate of 14.0%, and are as follows:

- Phase 1 (2014 – 2018): USD 267.9M (present value: USD 189.0M), benefiting a total of 1.288M new users;
- Phase 2 (2019 – 2022): USD 487.5M (present value: USD 216.8M), benefiting a total of 1.270M new users; and
- Phase 3 (2023 – 2026): USD 258.1M (present value: USD 66.0M), benefiting a total of 1.060M new users.

This estimate takes into account the likely mix of technologies, expected citizen demand, and the initial implementation capacity of the local governments. Investment capacity nearly tripled over the initial lifespan of the PAT programme, and it is expected that the NRWSSP will show similar increases in disbursements as Programme rules and methodologies are better understood, and municipal implementation capacity improves.

**Table 8.15: Programme management costs - NRWSSP (USDx1000)**

| PROVINCE | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NATIONAL LEVEL** | | | | | | | | | | | | | |
| Staff salaries | 946 | 1,046 | 1,077 | 1,110 | 1,536 | 1,582 | 1,630 | 1,678 | 1,265 | 1,177 | 1,002 | 1,032 | 15,082 |
| Other staff costs | 787 | 875 | 915 | 952 | 1,292 | 1,346 | 1,386 | 1,428 | 857 | 807 | 705 | 726 | 12,076 |
| Office equipment , furnishings | 175 | 0 | 0 | 0 | 141 | 0 | 0 | 0 | 143 | 0 | 0 | 0 | 458 |
| Field equipment | 103 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 108 |
| Office expenditures, recurrent | 192 | 198 | 204 | 210 | 217 | 223 | 230 | 237 | 139 | 143 | 147 | 152 | 2,292 |
| **SUBTOTAL** | **2,202** | **2,120** | **2,197** | **2,272** | **3,189** | **3,151** | **3,245** | **3,343** | **2,405** | **2,128** | **1,855** | **1,910** | **30,017** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | |
| Staff salaries | 1,205 | 1,241 | 1,278 | 1,317 | 1,356 | 1,397 | 1,439 | 1,482 | 440 | 161 | 166 | 171 | 11,655 |
| Other staff costs | 779 | 830 | 868 | 880 | 1,196 | 1,253 | 1,269 | 1,307 | 198 | 73 | 75 | 77 | 8,805 |
| Office equipment , furnishings | 349 | 1 | 9 | 18 | 202 | 19 | 20 | 21 | 169 | 22 | 22 | 23 | 876 |
| Field equipment | 287 | 0 | 0 | 0 | 2,143 | 0 | 0 | 0 | 128 | 0 | 0 | 0 | 2,558 |
| Office expenditures, recurrent | 461 | 475 | 489 | 504 | 692 | 713 | 734 | 716 | 195 | 201 | 207 | 213 | 5,601 |
| **SUBTOTAL** | **3,082** | **2,547** | **2,645** | **2,719** | **5,590** | **3,382** | **3,463** | **3,526** | **1,131** | **456** | **470** | **484** | **29,495** |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | |
| Staff salaries | 2,607 | 2,685 | 1,844 | 950 | 12,707 | 17,538 | 9,032 | 9,303 | 0 | 0 | 0 | 0 | 56,666 |
| Other staff costs | 1,514 | 1,808 | 1,244 | 715 | 9,272 | 11,109 | 5,812 | 2,819 | 0 | 0 | 0 | 0 | 34,295 |
| Office equipment , furnishings | 1,520 | 783 | 0 | 0 | 12,663 | 6,910 | 0 | 0 | 0 | 0 | 0 | 0 | 21,876 |
| Field equipment | 1,611 | 0 | 0 | 0 | 13,653 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15,265 |
| Office expenditures, recurrent | 380 | 391 | 403 | 415 | 2,852 | 2,937 | 3,025 | 3,116 | 0 | 0 | 0 | 0 | 13,521 |
| **SUBTOTAL** | **7,633** | **5,668** | **3,492** | **2,080** | **51,147** | **38,494** | **17,869** | **15,238** | **0** | **0** | **0** | **0** | **141,622** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | |
| **TOTAL (USD)** | **12,918** | **10,334** | **8,333** | **7,072** | **59,926** | **45,027** | **24,577** | **22,107** | **3,536** | **2,584** | **2,325** | **2,395** | **201,134** |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COST BY PHASE** | | | | | | | | | | | | | |
| Phase 1 | 12,918 | 10,334 | 8,333 | 7,072 | | | | | | | | | 38,657 |
| Phase 2 | | | | | 59,926 | 45,027 | 24,577 | 22,107 | | | | | 151,638 |
| Phase 3 | | | | | | | | | 3,536 | 2,584 | 2,325 | 2,395 | 10,839 |
| **CUM. TOTAL (USD)** | **12,918** | **23,252** | **31,585** | **38,657** | **98,584** | **143,611** | **168,188** | **190,295** | **193,831** | **196,415** | **198,740** | **201,134** | **201,134** |

*Costs subject to 3% annual inflation.*

**Table 8.16: Summary of programme costs and beneficiaries, NRWSSP (USDx1000 except as noted)**

| DESCRIPTION | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WATER SUPPLY** | | | | | | | | | | | | | |
| **Water supply infrastructure - new services** | | | | | | | | | | | | | |
| Bengo | 422 | 651 | 838 | 1,094 | 1,305 | 1,344 | 1,070 | 1,102 | 1,135 | 1,169 | 1,204 | 1,240 | 12,571 |
| Benguela | 884 | 1,367 | 1,759 | 2,295 | 2,738 | 2,820 | 2,244 | 2,312 | 2,381 | 2,452 | 2,526 | 2,602 | 26,380 |
| Bié | 1,545 | 2,388 | 3,074 | 4,011 | 4,783 | 4,927 | 3,921 | 4,039 | 4,160 | 4,285 | 4,413 | 4,546 | 46,090 |
| Cabinda | 215 | 332 | 428 | 558 | 665 | 685 | 546 | 562 | 579 | 596 | 614 | 632 | 6,413 |
| Cunene | 910 | 1,405 | 1,809 | 2,361 | 2,815 | 2,900 | 2,308 | 2,377 | 2,449 | 2,522 | 2,598 | 2,676 | 27,129 |
| Huambo (2) | 3,277 | 7,088 | 8,343 | 6,803 | 3,688 | 1,330 | 815 | 840 | 865 | 891 | 917 | 945 | 35,801 |
| Huila | 1,903 | 2,940 | 3,785 | 4,938 | 5,890 | 6,066 | 4,828 | 4,973 | 5,122 | 5,276 | 5,434 | 5,597 | 56,752 |
| Kuando Kubango | 315 | 486 | 626 | 816 | 974 | 1,003 | 798 | 822 | 847 | 872 | 898 | 925 | 9,382 |
| Kuanza Norte | 300 | 464 | 598 | 780 | 930 | 958 | 762 | 785 | 809 | 833 | 858 | 884 | 8,961 |
| Kuanza Sul | 1,306 | 2,018 | 2,598 | 3,389 | 4,042 | 4,163 | 3,314 | 3,413 | 3,515 | 3,621 | 3,730 | 3,841 | 38,950 |
| Luanda | 1,361 | 2,103 | 2,707 | 3,532 | 4,212 | 4,339 | 3,453 | 3,557 | 3,663 | 3,773 | 3,886 | 4,003 | 40,589 |
| Lunda Norte | 858 | 1,326 | 1,707 | 2,227 | 2,656 | 2,735 | 2,177 | 2,242 | 2,310 | 2,379 | 2,450 | 2,524 | 25,591 |
| Lunda Sul (2) | 1,685 | 3,644 | 4,290 | 3,498 | 1,896 | 684 | 419 | 432 | 445 | 458 | 472 | 486 | 18,408 |
| Malanje | 936 | 1,447 | 1,863 | 2,430 | 2,898 | 2,985 | 2,376 | 2,447 | 2,521 | 2,596 | 2,674 | 2,755 | 27,929 |
| Moxico | 303 | 469 | 603 | 787 | 939 | 967 | 769 | 793 | 816 | 841 | 866 | 892 | 9,044 |
| Namibe | 116 | 179 | 231 | 301 | 359 | 370 | 294 | 303 | 312 | 322 | 331 | 341 | 3,460 |
| Uige (2) | 2,735 | 5,916 | 6,964 | 5,679 | 3,079 | 1,110 | 680 | 701 | 722 | 744 | 766 | 789 | 29,884 |
| Zaire | 347 | 537 | 691 | 901 | 1,075 | 1,107 | 881 | 908 | 935 | 963 | 992 | 1,022 | 10,358 |
| **Subtotal** | **19,418** | **34,758** | **42,914** | **46,400** | **44,943** | **40,491** | **31,657** | **32,606** | **33,584** | **34,592** | **35,630** | **36,699** | **433,692** |
| **Water supply infrastructure - rehabilitated existing services** | | | | | | | | | | | | | |
| Water system design 15% | 2,913 | 5,214 | 6,437 | 6,960 | 6,741 | 6,074 | 4,748 | 4,891 | 5,038 | 5,189 | 5,344 | 5,505 | 65,054 |
| **Subtotal** | **2,913** | **5,214** | **6,437** | **6,960** | **6,741** | **6,074** | **4,748** | **4,891** | **5,038** | **5,189** | **5,344** | **5,505** | **65,054** |
| **Other services** | | | | | | | | | | | | | |
| Water system design 5% | 1,117 | 1,999 | 2,468 | 2,668 | 2,584 | 2,328 | 1,820 | 1,875 | 1,931 | 1,989 | 2,049 | 2,110 | 24,937 |
| Community momobilization 10% | 2,233 | 3,997 | 4,935 | 5,336 | 5,168 | 4,657 | 3,641 | 3,750 | 3,862 | 3,978 | 4,097 | 4,220 | 49,875 |
| Construction supervision 5% | 1,117 | 1,999 | 2,468 | 2,668 | 2,584 | 2,328 | 1,820 | 1,875 | 1,931 | 1,989 | 2,049 | 2,110 | 24,937 |
| **Subtotal** | **4,466** | **7,994** | **9,870** | **10,672** | **10,337** | **9,313** | **7,281** | **7,499** | **7,724** | **7,956** | **8,195** | **8,441** | **99,749** |
| **SUBTOTAL** | **26,797** | **47,966** | **59,221** | **64,032** | **62,021** | **55,878** | **43,686** | **44,997** | **46,346** | **47,737** | **49,169** | **50,644** | **598,495** |
| **SANITATION & HYGIENE PROMOTION** | | | | | | | | | | | | | |
| National | 360 | 167 | 150 | 124 | 2,131 | 1,030 | 957 | 796 | 714 | 614 | 757 | 652 | 8,452 |
| Provincial | 831 | 672 | 363 | 35 | 51 | 46 | 40 | 39 | 38 | 39 | 40 | 41 | 2,233 |
| Municipal | 0 | 2,571 | 3,049 | 3,764 | 17,165 | 20,137 | 15,815 | 13,666 | 8,917 | 5,851 | 5,199 | 5,032 | 101,166 |
| **SUBTOTAL** | **1,191** | **3,409** | **3,562** | **3,923** | **19,347** | **21,212** | **16,812** | **14,500** | **9,669** | **6,504** | **5,996** | **5,725** | **111,851** |

**Table 8.16 (continued): Summary of programme costs and beneficiaries, NRWSSP (USDx1000 except as noted)**

| DESCRIPTION | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CAPACITY BUILDING** | | | | | | | | | | | | | |
| National | 870 | 2,166 | 2,879 | 3,770 | 3,739 | 3,889 | 3,713 | 3,954 | 1,758 | 1,777 | 1,831 | 2,206 | 32,561 |
| Provincial | 766 | 853 | 887 | 1,401 | 2,837 | 3,104 | 2,160 | 1,538 | 261 | 269 | 277 | 228 | 14,589 |
| Municipal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SUBTOTAL** | **1,636** | **3,019** | **3,766** | **5,171** | **6,576** | **6,993** | **5,873** | **5,492** | **2,019** | **2,046** | **2,107** | **2,434** | **47,150** |
| **MONITORING & REPORTING** | | | | | | | | | | | | | |
| National | 386 | 363 | 200 | 29 | 60 | 54 | 41 | 33 | 34 | 35 | 36 | 37 | 1,307 |
| Provincial | 420 | 183 | 141 | 103 | 2,417 | 1,084 | 851 | 637 | 355 | 365 | 376 | 388 | 7,320 |
| Municipal | 0 | 923 | 1,259 | 1,494 | 6,360 | 8,331 | 6,798 | 5,847 | 4,483 | 3,653 | 3,529 | 3,554 | 46,232 |
| **SUBTOTAL** | **807** | **1,469** | **1,600** | **1,626** | **8,838** | **9,469** | **7,690** | **6,517** | **4,872** | **4,054** | **3,941** | **3,979** | **54,860** |
| **PROGRAM MANAGEMENT** | | | | | | | | | | | | | |
| National | 2,202 | 2,120 | 2,197 | 2,272 | 3,189 | 3,151 | 3,245 | 3,343 | 2,405 | 2,128 | 1,855 | 1,910 | 30,017 |
| Provincial | 3,082 | 2,547 | 2,645 | 2,719 | 5,590 | 3,382 | 3,463 | 3,526 | 1,131 | 456 | 470 | 484 | 29,495 |
| Municipal | 7,633 | 5,668 | 3,492 | 2,080 | 51,147 | 38,494 | 17,869 | 15,238 | 0 | 0 | 0 | 0 | 141,622 |
| **SUBTOTAL** | **12,918** | **10,334** | **8,333** | **7,072** | **59,926** | **45,027** | **24,577** | **22,107** | **3,536** | **2,584** | **2,325** | **2,395** | **201,134** |
| **TOTALS BY PHASE** | | | | | | | | | | | | | |
| Phase 1 | 43,349 | 66,197 | 76,483 | 81,825 | | | | | | | | | 267,870 |
| Phase 2 | | | | | 156,708 | 138,579 | 98,638 | 93,613 | | | | | 487,538 |
| Phase 3 | | | | | | | | | 66,442 | 62,925 | 63,538 | 65,177 | 258,082 |
| **CUM. TOTAL (USD)** | **43,365** | **109,562** | **186,045** | **267,870** | **424,579** | **563,157** | **661,796** | **755,408** | **821,850** | **884,775** | **948,313** | **1,013,490** | **1,013,490** |
| **PRESENT VALUE TOTALS (3)** | | | | | | | | | | | | | |
| Phase 1 | 38,025 | 50,937 | 51,624 | 48,447 | | | | | | | | | 189,049 |
| Phase 2 | | | | | 81,389 | 63,135 | 39,420 | 32,817 | | | | | 216,760 |
| Phase 3 | | | | | | | | | 20,431 | 16,974 | 15,034 | 13,528 | 65,967 |
| **CUM. TOTAL (USD)** | **38,041** | **88,978** | **140,602** | **189,049** | **270,438** | **333,573** | **372,992** | **405,809** | **426,241** | **443,214** | **458,248** | **471,776** | **471,776** |
| **NEW USERS BY PHASE (x 1000 USERS)** | | | | | | | | | | | | | |
| Phase 1 | 184 | 316 | 380 | 406 | | | | | | | | | 1,288 |
| Phase 2 | | | | | 391 | 348 | 265 | 265 | | | | | 1,270 |
| Phase 3 | | | | | | | | | 265 | 265 | 265 | 265 | 1,060 |
| **CUM. NEW USERS** | **184** | **501** | **881** | **1,288** | **1,679** | **2,027** | **2,292** | **2,557** | **2,822** | **3,087** | **3,352** | **3,618** | **3,618** |

*1. Costs subject to 3% annual inflation.*

*2. Phase 1 pilot province*

*3. Present values calculated using 14% discount rate.*

## 8.7 Programme funding and planning

Following the Phase 1 pilot, the NRWSSP will be national in scope. Funding sources are expected to include direct national budget provisions, loans from development partners or donors, provincial and municipal government funds, and contributions from beneficiaries either in cash or in-kind. Other donor organisations may participate in Programme finance starting in Phase 2. Phase 3 marks the initiation of a dedicated, national Rural WASH Fund expected to obtain funding from a variety of international, national, and local sources.

African Development Bank financial participation requires the approval of legal agreements between the Bank and the Angolan government, with terms negotiated directly between the parties. Provincial and municipal funds in their vast majority are appropriated from the national budget given the limited revenue sources and taxing power of local government. Funds are available for both administrative expenditures and capital expenditures, the latter assigned as part of the Public Investment Plan. Community and household financial contributions are expected to be principally in kind during the pre-implementation period, and to be negligible during implementation in the initial two phases. Household funding as required under MoGeCA, consists exclusively of user tariffs.

The Programme funding window will be defined during negotiation of the NRWSSP by the national government with relevant donors, as well as relevant ministries.

The Programme will supply funding at the national, provincial, and municipal levels, including the PMU. All capital expenditures will be provided 100% by the Programme during its initial two phases. The third phase is expected to require local government and citizen contributions of varying percentages based upon different considerations.

Relevant operational expenditures, on the other hand, will initially be provided at or near 100% for all Programme implementing agencies including MINEA/DNA, MINAMB, DPEA, and the municipal governments. It is projected that over the length of the Programme the municipal and provincial governments will partially assume their Programme-related operational costs in a percentage to be determined.

The planning process for the NRWSSP takes place at multiple levels: national, Programme, and local. The Government of Angola's planning process requires inputs from the municipal, provincial, and ministerial levels. In the case of programmes and projects funded jointly by the government and an international development bank, funds are subject to the specific agreements in place and do not necessarily follow the established government budgeting process.

As summarized in Section 8.6 and detailed in Annex B, the NRWSSP is planned in three four-year phases, with each phase considered independently with respect to investment totals. At the time of writing this report, the proposed funding for Phase 1 amounts to approximately USD 267.9M, with 50% originating from the national budget, and 50% from AfDB or other sources. A summary of the Phase 1 funding estimate, by source, is shown in Table 8.17.

**Table 8.17: NRWSSP Phase 1 funding, by source**

| YEAR | GoA | AfDB | TOTAL |
|---|---|---|---|
| YEAR 1 | 21,674 | 21,674 | 43,349 |
| YEAR 2 | 33,099 | 33,099 | 66,197 |
| YEAR 3 | 38,242 | 38,242 | 76,483 |
| YEAR 4 | 40,913 | 40,913 | 81,825 |
| **TOTALS:** | **133,935** | **133,935** | **267,870** |

Based on the initial budgets provided in this report, subsequent modified budget requests will be prepared annually by the PMU and submitted as detailed in the relevant Programme financing agreements. Funding amounts for participating government agencies will be determined annually on schedule with the government's annual planning cycle. The PMU's provincial offices will coordinate funding envelopes and any co-financing

issues with the DPEA and the municipalities, with final negotiations, if needed, resolved from the national PMU.

More detailed guidance on Programme financial arrangements is included in the Operations Manual.

# ANNEX A

## Sample project conceptual designs & cost estimates

# ANNEX A

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# 1 INTRODUCTION

The conceptual design report for water and sanitation systems in six communities in the provinces of Uige, Huambo and Lunda Sul has been prepared as part of Phase 2 of the development of the National Rural Water Supply and Sanitation Programme (NRWSSP) in Angola. The designs presented herein form the basis for standardized projects for planning purposes and are representative of a full range of conditions, water sources and service levels. The designs have been prepared to a conceptual level, based on rapid field assessments to collect the information needed. These form the basis of standardised projects for planning purposes and have been used as standardized project modules in the preparation of the NRWSSP investment plan.

The purpose of this report is to provide conceptual designs for six sample projects in selected communities. The report covers the following:

- Methodology;
- General description of the communities, including climate, hydrology, geology and hydrogeology;
- Design guidelines, including population projections, water demand and design criteria;
- Review of options considered for water supply and sanitation;
- Management, including mechanisms proposed for community management, operation and maintenance (O&M) and cost recovery; and
- Conceptual designs for each of the six communities (community description, existing water supply and sanitation situation, population and water demand, system design, and costs).

# 2 METHODOLOGY

The methodology followed to develop the conceptual designs in selected communities consists of five major steps, as follows:

**STEP 1 SITE SURVEY**

Field visits were carried out to each community to meet with local leaders and future users, facilitate participatory consultations, collect information on existing water supply and sanitation situation and conduct socio-economic household surveys. Tools utilized included: handheld GPS; camera; and statistical analysis software.

**STEP 2 MAPPING AND CONSUMPTION ESTIMATES**

Geo-referenced, conceptual maps of the community were prepared and water demand was estimated. Tools utilized included: GIS software; satellite imagery (Google, Bing); and digital elevation model (ASTER GDEM v2, 2012).

**STEP 3 SELECTION OF SYSTEM COMPONENTS**

Design decisions were taken for the various system components and options.

**STEP 4 SYSTEM SIZING**

System components were sized to enable preliminary costing of the project. Tools used include EPANET hydraulic modeling software.

**STEP 5 COSTING**

Unit costs developed for this study were applied to the conceptual designs to estimate total project capital and O&M costs.

# 3 GENERAL DESCRIPTION OF COMMUNITIES

## 3.1 General

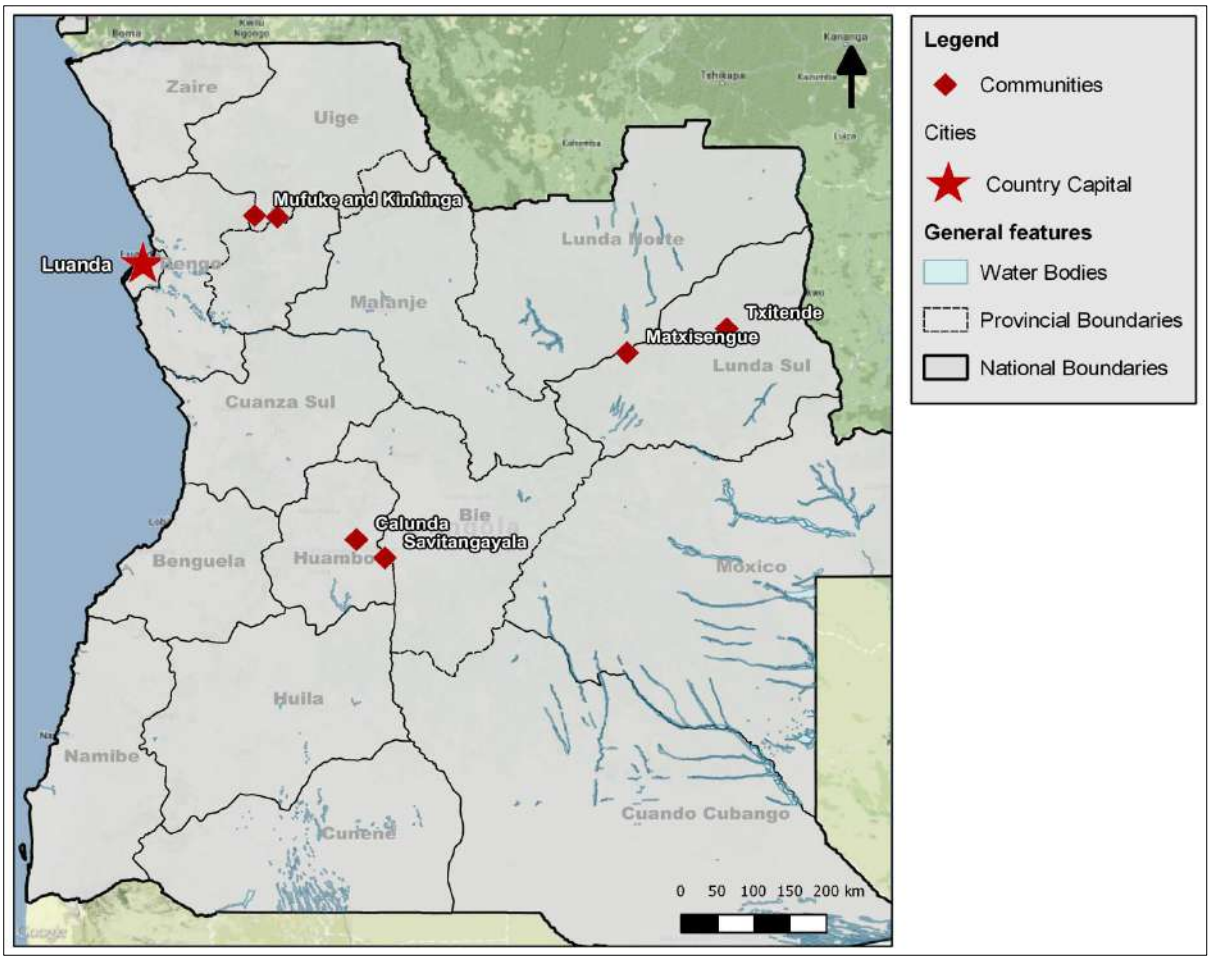
The communities selected for the sample project reports are listed in Table 1.

**Table 1: Selected Communities**

| PROVINCE | MUNICIPALITY | COMMUNE | VILLAGE |
|---|---|---|---|
| Huambo | Cachiungo | Chiumbo | Calunda |
| | Cachiungo | Chinhama | Savitangayala |
| Uige | Quitexe | Sede | Kinhinga |
| | Quitexe | Cambambe | Mufuke |
| Lunda Sul | Kacolo | Kacolo | Matxisengue |
| | Muconda | Muriege | Txitende |

These rural communities, shown on the map below (Figure 1), have populations ranging from about 400 to 2,700 inhabitants.

**Figure 1: Location of Selected Communities**




The population estimates, latitude and longitude (in decimal degrees – DD) are provided for each village/community in Table 2.

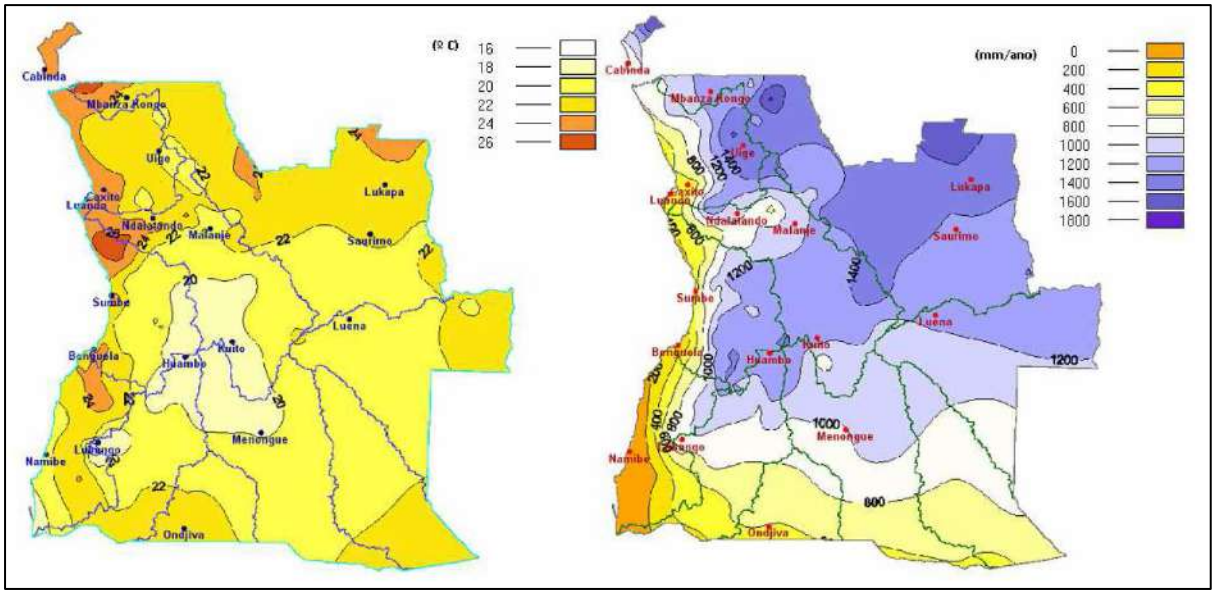
**Table 2: Community Population and Location**

| VILLAGE | POPULATION | LATITUDE (DD) | LONGITUDE (DD) |
|---|---|---|---|
| Calunda | 2,650 | -12.51223 | 16.03488 |
| Savitangayala | 1,300 | -12.75311 | 16.40395 |
| Kinhinga | 1,800 | -08.21499 | 15.00815 |
| Mufuke | 1,030 | -08.19552 | 14.71365 |
| Matxisengue | 1,500 | -10.03014 | 19.54892 |
| Txitende | 380 | -09.70783 | 20.84365 |

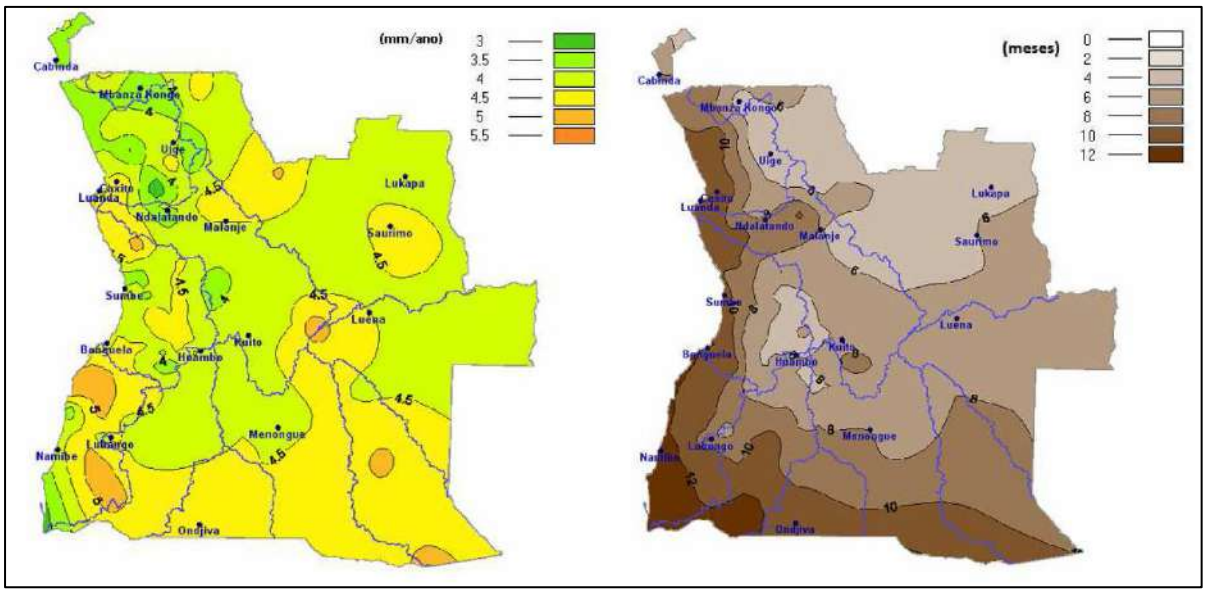
## 3.2 Climate

The climate in the project area is characterized by alternating rainy and dry seasons. The following figures provide an overview of key climate parameters interpolated at a national scale[1].

**Figure 2: Maps of a) average daily temperature (ºC), b) average annual rainfall (mm/year), c) reference evapotranspiration (mm/year) and d) number of months with a water deficit**




[1] Honrado, J. et al. (2010). *Plano Nacional Director de Irrigação de Angola: Uma síntese dos estudos*. COBA S.A., Portugal. http://sir.dgadr.pt/conteudos/jornadas_aph/apresentacoes/s1/18.pdf; Accessed 2013.

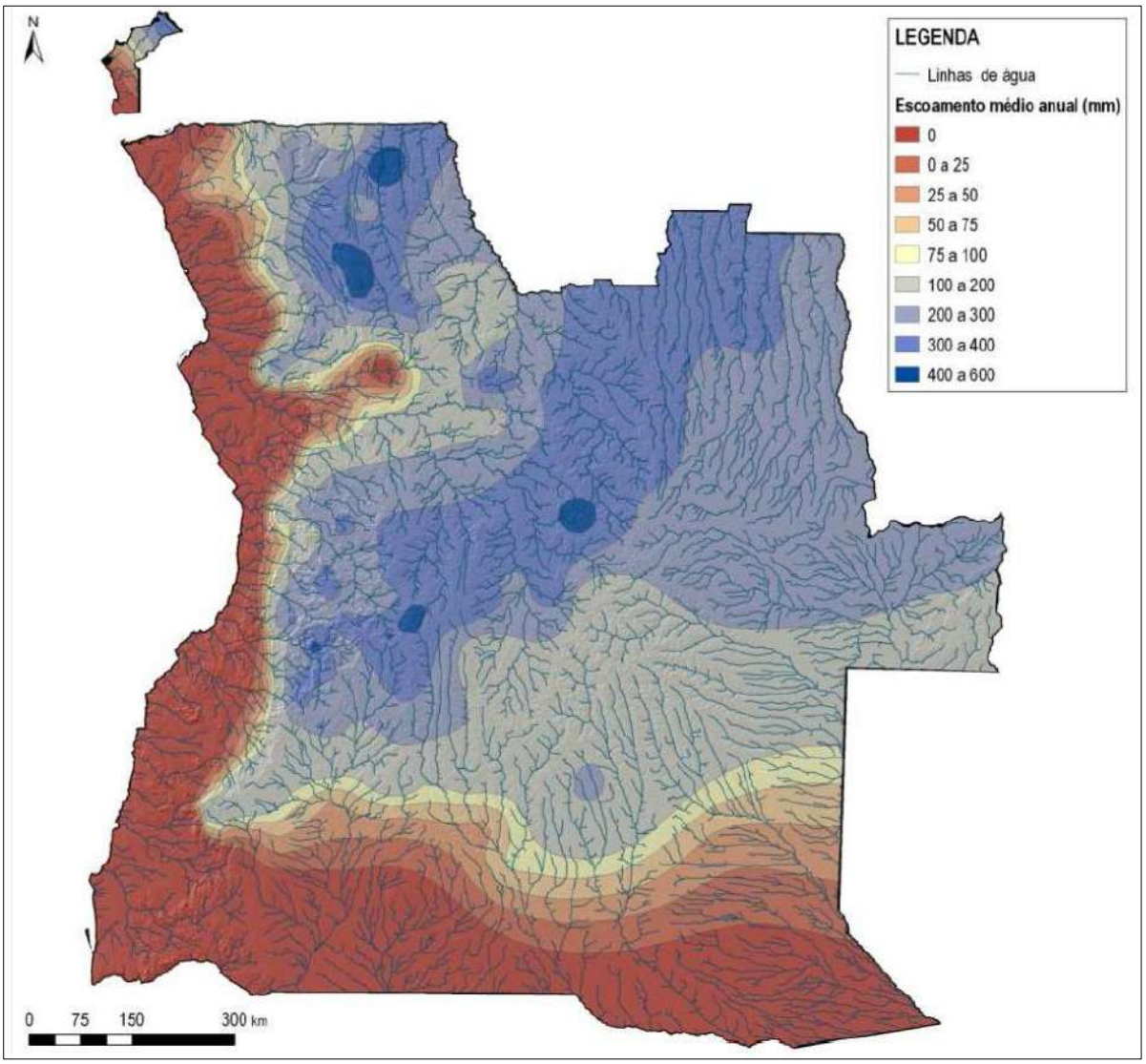



The Province of Uige is confined in a region designated by “zone torrid”, a predominantly warm tropical climate and humid/sub-humid environment characterized by two distinct seasons. The rainy season starts in September-October and continues until May. The months of November and April usually see the most rainfall, and the dry season runs from June to August. The precipitation values reach about 1,500 mm per year. There is little to no rain during the dry season, but humidity stays at high levels. Average annual temperatures range from 22 to 25 Celsius degrees, and the relative humidity varies between 75 and 90%. The altitude in the province varies as follows: 800 m to 1,300 m in the plateau, 1,100 m to 1,200 m in the mountains and valleys of 600 to 800 m. A large part of the territory has good soil and climatic conditions that favour the development of farming and ranching.

On the other hand, the Province of Huambo is located on the foundation of the Central Plateau, well within the tropical zone. The combined effects from altitude and the oceanic currents result in a moderate climate. The precipitation values vary from 800 to 1,400 mm per year depending on the region, and average temperature ranges from 18 to 22 Celsius degrees. The southern and higher areas of the province typically experience colder temperatures than anywhere else. The Province of Lunda Sul experiences average daily temperatures between 20 and 22 Celsius degrees, with precipitation values ranging between 1,200 and 1,400 mm per year.

The map presented below provides a good indication of the precipitation level and the associated average annual runoff. Runoff, the major component of the water cycle, occurs when the soil is infiltrated to maximum capacity and excess water from rain or other sources flow over the land. The selected communities in Uige and Huambo are actually located in the area with the highest level of surface runoff (up to 400 – 600 mm/year), while the communities in the Province of Lunda Sul experience slightly less (up to 200 – 300 mm/year).

**Figure 3: Average annual runoff in Angola[1]**



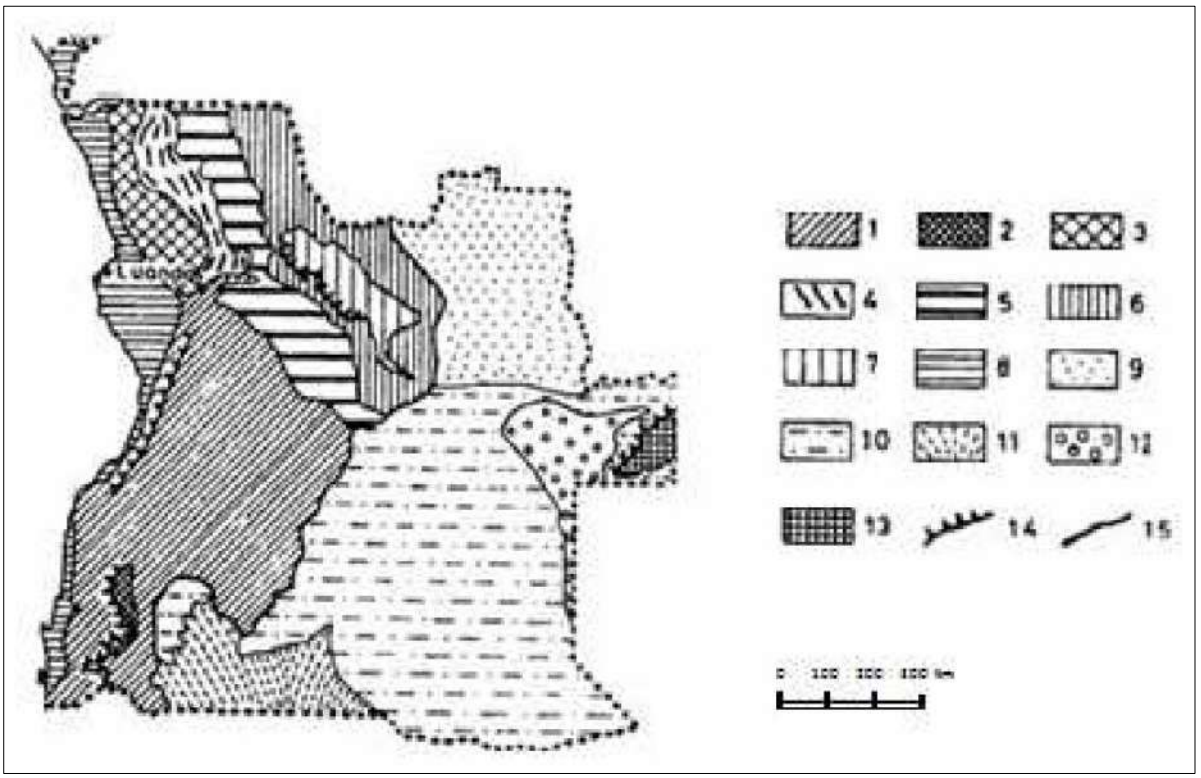

## 3.3 Geomorphology

The geomorphology at a national scale can be characterized by two main Eastern and Western zones[1]. The Eastern zone is set apart by a relief of accumulation, while the Western zone is predominantly characterized by relief denudation, with intense erosion phenomena. The following geo-morphological sub-sections are displayed on the map in Figure 4:

- I Western Zone:
  - 1 Central highlands;
  - 2 Chain of mountains;
  - 3 Plain Maiombe;
  - 4 Zenza mountain range – Loge;
  - 5 Kwanza corrugated plain – Longe;
  - 6 Dry plains of Cuango;
  - 7 Depression of Cassanje;
  - 8 Costal depression;

- II Eastern Zone:
  - 9 Plateau Lunda;
  - 10 East plains;
  - 11 Cuene plains;
  - 12 Depression Cameia – Lumbate;
  - 13 Rise of the upper Zambezi;
- III Other areas:
  - 14 Most important steps formed by the effects of tectonic movements and denudation;
  - 15 Boundary between the eastern and western parts.

**Figure 4: Outline of geomorphological units of the territory of Angola**




The Province of Huambo covers much of the highest ground in Angola, including the most prominent peak in the country – Mt Môco at 2,620 m. The plateau drops sharply down to the coastal plain in the west, but slopes more gradually and evenly away to the east. The main geomorphological units are the central highlands and plains, which are also cut by some of Angola's major rivers (the most notable of these being the Cuanza).

The Province of Uige is a very rugged area, with general characteristics similar to those of the rest of the country. It consists of the following areas:

- Plateau – recognized by the majority of the Zaire River basin tributaries, with waters flowing north. This zone is undulating, but with deep ravines especially in large rivers.
- Zone of the Mbridge River Basin – lies southwest of the line Pete-Mucaba-Songo-Mabaia. This area has deep ravines along the rivers, is low in altitude and slightly wavy.
- Mountainous Area – covering the interior of the province, especially the Loge Dange and other rivers, as well as the basins of the tributaries.

Finally, the Province of Lunda Sul displays similar geomorphological features in that it is characterized by the plateau Lunda and the dry plains of Cuango, without the mountainous areas present in the two other provinces.

# 4 DESIGN GUIDELINES

## 4.1 Population projections and water demand

The key assumptions and design guidelines used for the population projections and water demand calculations are summarized in Table 3. The population projections will be made assuming a regional growth rate of 1.4% over a period of 20 years. These recommended values have been established based on current best practices in the Angola rural water supply sector, but also in similar contexts internationally.

**Table 3: Design guidelines and key assumptions**

| PARAMETER | RECOMMENDED VALUE |
|---|---|
| Population growth rate | 1.40% |
| Persons per household | 6 |
| Design period | 20 years |
| Daily water consumption | 30 L/person/day |
| Peak daily factor | 1.3 |
| Peak hourly factor | 2 |
| Allowance for physical losses | 10% of average daily demand |
| Number of persons per standpipe | 250 |
| Number of taps per standpipe | 1 |
| Maximum walking distance* | 500 m |
| 100% of the population served by standpipes (no house connections at this conceptual stage) | |
| No alternative improved sources are present in the community | |
| No special connections for institutions, but a standpipe will be located in close proximity | |

**A maximum walking distance of up to 500m was selected based on the rural context, with 100m being ideal where possible.*

## 4.2 Design criteria

The following criteria were used to prepare the conceptual design of the systems. In cases where pipe sizing is involved, an Epanet model was used to perform the hydraulic calculations on the water network and design the different system components by iteration according to these criteria.

**Table 4: Design Guidelines**

| PARAMETER | RECOMMENDED VALUE |
|---|---|
| HYDRAULIC PARAMETERS | |
| Pipe pressure | Dynamic pressure at standpipes should be between 10 and 30 m;<br>Maximum residual pressure in the delivery pipe is 80 m (subject to change depending on the pipe specifications); |
| Maximum water velocity | 3 m/s |
| Head losses | Minimize head losses in general and avoid anything over 10 m of head loss/km of pipe |
| SIZING PARAMETERS | |

| PARAMETER | RECOMMENDED VALUE |
|---|---|
| Distribution system sized for hourly peak water demand | |
| Minimum pipe size for distribution | 50 mm |
| Reservoir volume | 40% of daily peak water demand |
| Number of taps per standpipe | 1 |
| ADDITIONAL PARAMETERS | |
| Maximum production per hand pump | 12 m3/day |
| Maximum hours of electro-mechanical pumping (non-solar) | 16 hours/day |
| Maximum hours of solar pumping | 6 hours/day at peak efficiency |
| Maximum walking distance to a water point | 500 m |

# 5 REVIEW OF OPTIONS CONSIDERED

In each situation, an array of possible technical options was considered to provide improved water and sanitation services. These were identified through desk-based research, stakeholder consultations as well as household socioeconomic profiles established to identify potential water and sanitation technologies that are suitable, sustainable and acceptable by rural dwellers. Detailed information regarding these technologies can be found in the NRWSSP Phase 2 Report.

## 5.1 Water supply

Solutions for water supply should provide water of adequate quantity and quality for the inhabitants of each sample project area. Technical options vary in their applicability depending on source type, elevation, population density as well as operation and maintenance considerations. The following technical options for water supply are considered those most likely to be applied during the NRWSSP:

1. **Boreholes and hand pumps**: A tubewell or borehole is a deep hole that has been driven, bored or drilled, with the purpose of reaching groundwater supplies. Boreholes are constructed with casing, and water is delivered through a hand pump. They are usually protected by a platform around the installation, which leads spilled water away from the borehole and prevents infiltration of run-off water at the well head[2].
2. **Gravity-fed piped distribution**: A gravity-fed system supplies water to a community from a protected spring. A spring box is built around the spring and water flows out into a pipe. A transmission line takes the water to a main reservoir, from which distribution lines supply public standpipes strategically located in the community. Break-pressure tanks or valves can also be used if differences in elevation in the system are too high.
3. **Ram pump with piped distribution:** The ram-pump system is similar to the gravity-fed piped distribution system, except that water is pumped from a source (protected spring or small stream) to a main reservoir through the use of a hydraulic ram pump. This pump uses the energy of a large amount of water falling from a small height, to lift a small amount of water to a greater height. As such, specific elevation and terrain conditions are required for this option to be appropriate. The system components are the 1) spring box; 2) drive tank and associated drive pipe; 3) ram pump and pump basement; 4) transmission line; 5) reservoir and 6) distribution and standpipes.
4. **Solar pump with piped distribution:** Solar systems consist of a borehole and submersible pump powered by solar panels. Water is pumped to a reservoir then distributed by gravity to public standpipes in the community.
5. **Electromechanical pump with piped distribution:** This option is similar to the solar system, with the difference that the submersible pump is powered by electricity. Water is pumped to a reservoir then distributed by gravity to public standpipes in the community.
6. **Surface water with pump, treatment and piped distribution**: This final option consists of a surface water source (stream, river, lake or reservoir) pumped by a centrifugal pump to a treatment plant and then to a storage reservoir, from where it is distributed by gravity to public tap stands in the community. This option is not recommended to be widely used and is only appropriate where there is no alternative source of better quality and where it has been deemed by the government that cost is not a constraint. As a result, no

[2] JMP, Definitions and Methods, Drinking-water source categories: http://www.wssinfo.org/definitions-methods/watsan-categories/

conceptual design for this type of system was developed because in each community in this study other alternatives were available and more appropriate.

## 5.2 Sanitation

Improvements in sanitation under the NRWSSP will be achieved through a sanitation promotion campaign that will be implemented using a community-led total sanitation (CLTS) and sanitation marketing approach. As such, the programme will provide community mobilization and facilitation and technical assistance but the households themselves will be responsible for constructing latrine facilities. Latrine masons will be trained and available to provide services to households as required. A detailed description of the sanitation component of the NRWSSP can be found in Section 5 of the NRWSSP Phase 2 Report.

Appropriate latrine designs meeting basic hygiene and safety criteria at low cost should be developed within the NRWSSP. This can be conducted through a participatory design process which enables users to create, identify and select appropriate sanitation technologies. Latrine designs need to respond to the local conditions, both technical (e.g. sandy soil conditions present in some parts of Angola) and social. This includes the market conditions in terms of material availability and the local knowledge of masons and community members. Possible latrine designs, in addition to a basic pit with a sanplat and a ventilated improved pit (VIP) latrine include the aborloo and fossa altarna, and the double-pit pour-flush latrine. These are described in more detail in the NRWSSP Phase 2 Report.

# 6 SYSTEM MANAGEMENT, OPERATION & MAINTENANCE

Each type of technology has different management, operations and maintenance requirements, requiring varying levels of capacity. The goal of system management, operation and maintenance is to provide the community with an acceptable level of service over the long-term. Under MoGeCA, each water system should have a GAS to manage it on behalf of the community. In general, for every type of system, management will entail, among other tasks:

- collection of tariffs;
- financial management;
- system management (hours of operation and access);
- monitoring of O&M;
- conflict resolution; and
- reporting to local authorities.

Within the MoGeCA model, the community is responsible for routine maintenance and basic repairs (with or without the assistance of a mechanic), while more complex repairs are the responsibility of the BMEA. An operations and maintenance manual would be required of the contractor for each system detailing the preventative / routine maintenance tasks as well as information to troubleshoot larger more complex issues that may arise. The general O&M requirements for a water system are:

- regular cleaning of water points, tap stands, solar panels etc.;
- weekly, monthly and yearly checks and replacement of wearing parts,
- cleaning and greasing of moving parts;
- leakage and discharge tests;
- maintenance and repair of civil works (e.g. aprons, tap stands, tanks);
- network inspection and leakage reduction;
- flushing of various components (well, pipelines, etc.); and
- repairs in the case of a total or partial system breakdown.

# 7 CONCEPTUAL DESIGN FOR CALUNDA, HUAMBO PROVINCE

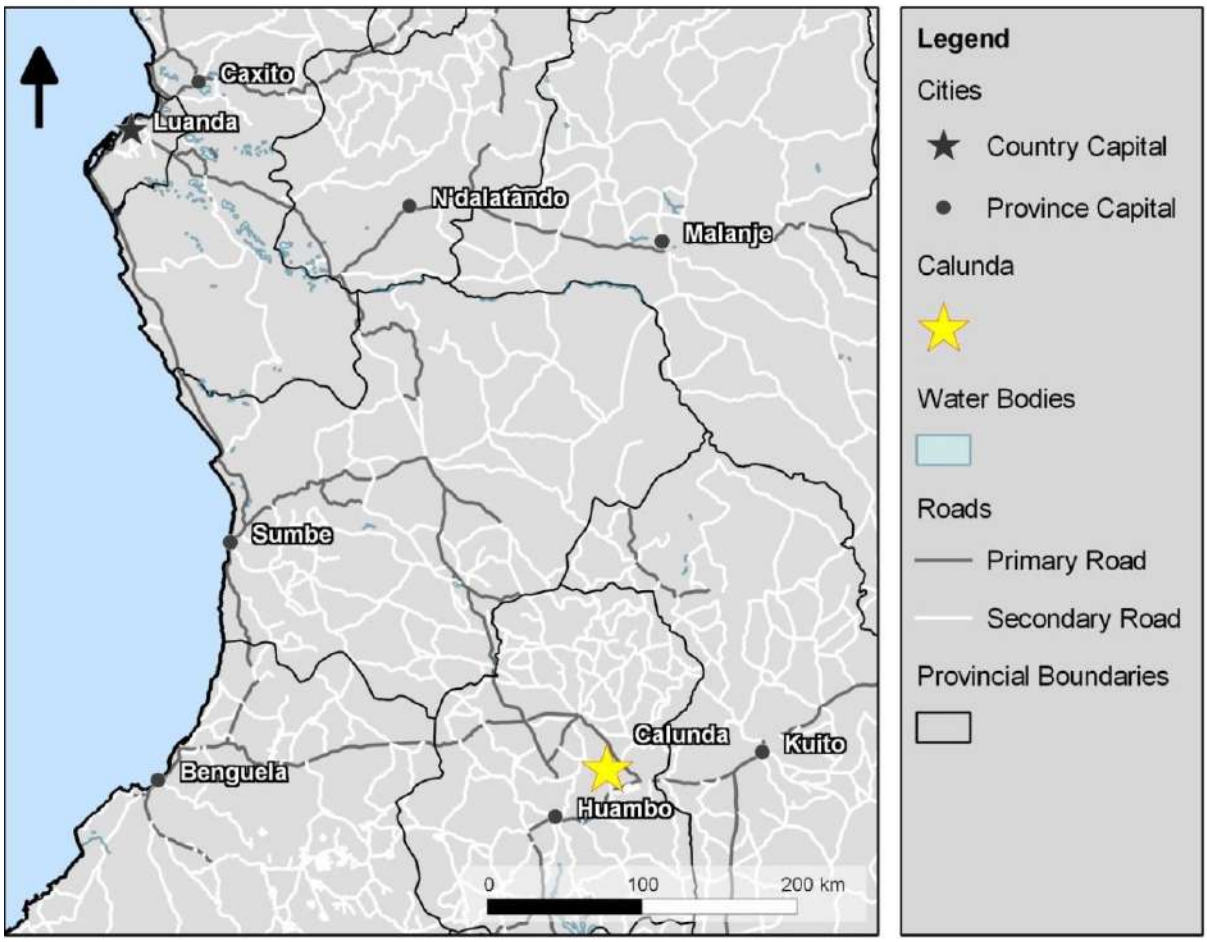
## 7.1 Community description

Calunda is a village/aldeia in the commune of Chiumbo, municipality of Cachiungo, province of Huambo (codes; Huambo 100101, Cachiungo 100501, Chiumbo 100502). The community is located at coordinates -12.500415, 16.026773 (latitude, longitude), approximately 85 km north-east of Huambo (refer to map – Figure 5).

The population was estimated at 2,650 people during the field visits. Contrary to the other communities visited, the population in Calunda is spread over a large area (refer to Figure 7 for photos). Few small clusters of houses are found and there is a lot of space between each house. For this reason, only a section of the area was covered during the field visits, and assumptions were made for the remaining areas based on conversations with villagers, local leaders and the general data available.

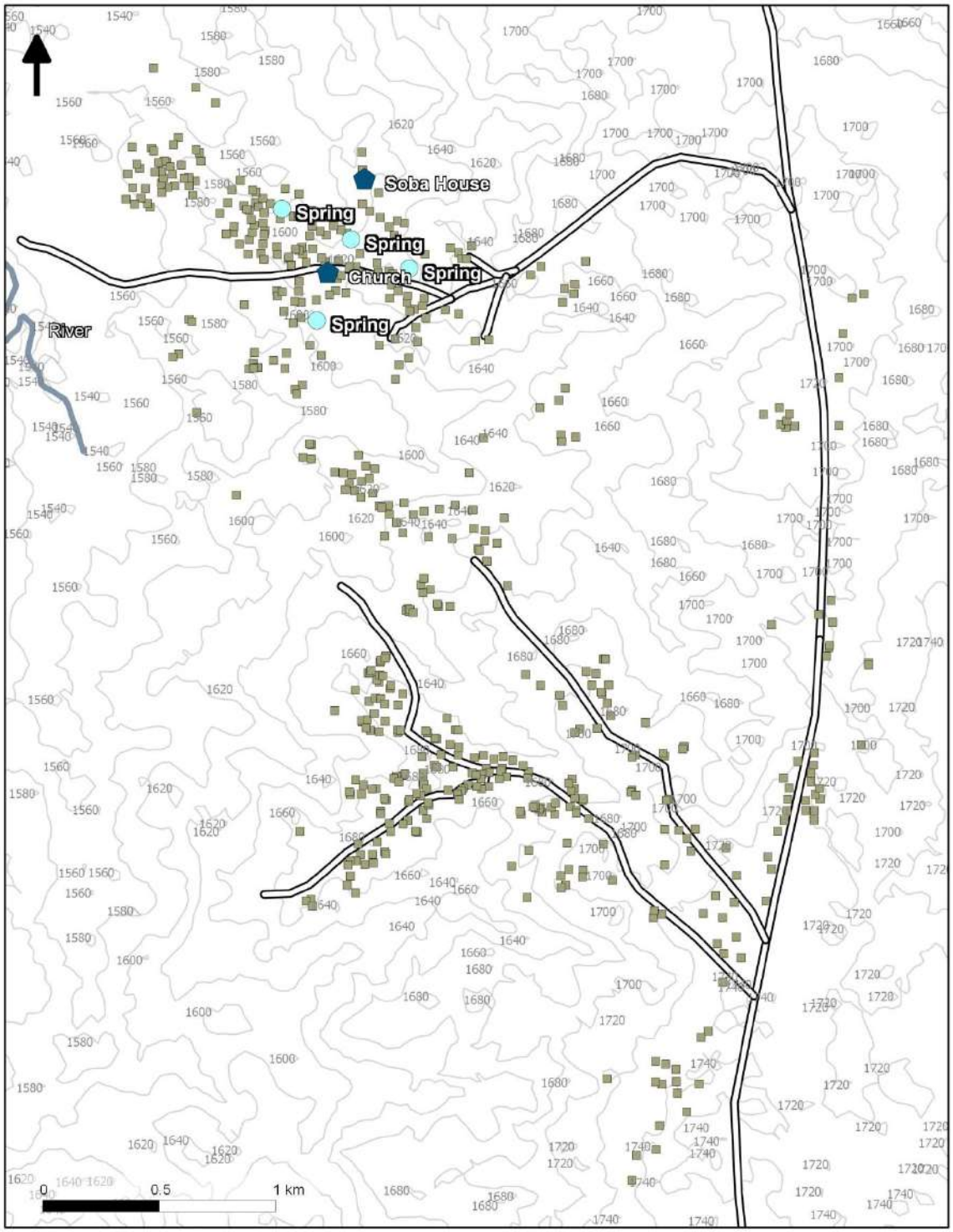
The region has a mix of dense vegetation and clear land, with many small streams and springs that could be used for water supply. The good water availability also indicates that groundwater could be considered. Four springs that could be used for a water system were identified in the area (refer to Figure 6) and will be described in more detail in Section 6.

**Figure 5: Location of Calunda in the Province of Huambo, Angola**



The population is currently using several unimproved water sources (including many seasonal springs) and a surface stream for their water needs. Estimates place the percentage of households with a latrine at about 80% with a small portion of the population practicing open defecation. Cases of diarrheal disease occur in the community.

**Figure 6: Calunda on Elevation Contour Basemap[3]**




[3] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

**Figure 7: Houses in Calunda (Indicating the low population density)**

## 7.2 Population

### 7.2.1 Demographics

As part of the study in the village the field team visited 25 of a total of 442 households, which corresponds to a sampling rate of 5.7%. The average household size is 6.7, with an average of 2.6 children under the age of 15, 1.5 females over the age of 15 and 1.3 males over the age of 15.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity at 68% (17 out of 25 households), followed by informal business at 20% (5 out of 25), health at 8% (2 out of 25) and lastly education at 4% (1 out of 25).

### 7.2.2 Population estimate

A house counting from satellite photos indicated 480 households in the community (refer to Table 5). This is in line with the population estimate of 2,650 that was conducted during field visits.

**Table 5: House Counting Summary (Calunda)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Calunda | 480 | 6 | 2,880 |

## 7.3 Existing water supply & sanitation situation

### 7.3.1 Water supply

**Current situation**

There is no water supply infrastructure currently functioning in the area. The local health centre has a small electric pump installed next to a protected hand dug well, with electricity supplied from the diesel generator used by the center. The water is pumped to a tank located approximately 150 m from the well. Four springs that could be used for a water system were identified in the area, as well as a river and several hand dug wells. These water sources will be detailed in the next section.

The population is currently using those unimproved water sources (springs) and a surface stream for their water needs. Discussions with health personnel indicate that diarrheal cases and malaria are prevalent. This problem is exacerbated during the rainy season when water quality at these sources deteriorates due to surface runoff, thereby increasing the incidence of these health problems. It was also reported that during the dry season some of these sources tend to dry up, leading to problems of water scarcity. Finally, it appears that animals at times share these same water sources, which represents a serious risk for human consumption.

Overall, findings suggest that 72% (18 out of 25) of the population consumes unfit water from springs, followed by 16% (4 out of 25) for streams, and the remaining 12% (3 out of 25) collect water from small dug wells along the streams. Responses regarding the treatment of water at home revealed that 88% (22 out of 25) do not use any form of treatment, while the remaining 12% (3 out of 25) use some form of treatment before drinking.

**Water sources**

As mentioned previously, four springs were identified during the field visit (refer to photos in Figure 8); however it is very likely that more springs are used by the beneficiaries as the complete area could not be visited. The estimated yields at the four springs are between 0.10 and 0.25 L/s. They could be sufficient for a number of families but not as a main supply for the community, even if combined.

**Figure 8: Spring 1 (left) and Spring 2 (right) in Calunda**

### 7.3.2 Sanitation

In many rural areas such as Calunda sanitation remains a huge impediment to health of the inhabitants, mainly because: 1) many households do not have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing in the area.

Households consulted during the field visits tended to claim that open defecation does not occur, however survey results indicate that 20% (5 out of 25) of homes practice open defecation while the remaining 80% (20 out of 25) use family latrines. This situation, coupled

with the quality of water at the unimproved water points currently in use explains the prevalence of diarrheal cases in the community.

### 7.3.3 Gender and walking distance

Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 48% (12 out of 25) of households surveyed, while 40% (10 out of 25) of households fetching water was stated to be a girls' responsibility and finally 12% (3 out of 25) indicated that water collection can be done by all members. These results validate the fact that fetching water is a female responsibility according to local customs and beliefs.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that households spend about an hour per day fetching water, as they have to walk over 1.5 km twice per day.

### 7.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 0.78 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would be willing to pay more for improved water supply. Moreover, it is estimated that households spend an average of USD 97.00 per month excluding expenditure on water.

The survey findings were confirmed by the focus groups, which also suggest that the community would be willing to pay at least USD 0.78 per $m^3$ for improved water services. However, many still have the perception that water is a right and it should not be priced.

## 7.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in Section 4 – Design Guidelines. The design parameters for Calunda are presented in Table 6 below.

**Table 6: Water demand calculation, Calunda**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| Population | | |
| Current population | persons | 2650 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 3499 |
| Daily consumption | | |
| Population served | persons | 3499 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | $m^3$/day | 104.98 |
| Physical losses | | |
| Physical losses | % of daily demand | 10% |
| Physical losses | $m^3$/day | 10.50 |

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| Water demand | | |
| Total average daily demand | $m^3$/day | 115.48 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |
| Daily Peak Demand | $m^3$/day | 150.13 |
| Hourly Peak Demand | $m^3$/day | 230.97 |
| Hourly Peak Demand | L/s | 2.67 |
| Number of standpipes | | |
| Number of persons per standpipe | persons | 250 |
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 14.0 |
| Number of standpipes (rounded) | - | 14 |
| Design flow per standpipe | L/s | 0.19 |
| Design flow at outlets | | |
| Design flow with hourly peak factor | L/s | 0.19 |
| Design flow without hourly peak factor | L/s | 0.10 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.19 L/s, and the daily average flow is 0.10 L/s. These values will be used in the Epanet hydraulic simulations for sizing the system.

## 7.5 System design

### 7.5.1 Review of technical options

Given the various sources investigated during the field mission, none are capable of supplying the whole community. Various options then exist for the future improvement of water supply in Calunda:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements.
- *Gravity distribution:* Most households are higher in elevation than the springs identified; therefore a gravity-fed piped system is not technically feasible. Additionally, the spring yields were insufficient.
- *Ram pump with gravity distribution:* Technically feasible. Water from the spring can be pumped using a ram pump to a delivery tank from which water is distributed by gravity, however the yield of the springs identified is too low.
- *Borehole with electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, subject to availability of electricity from the grid.
- *Solar pump with gravity distribution:* Technically feasible, if source used is one or many high-yield boreholes.
- *Surface water with pump, treatment and piped distribution*: Although there are streams in the area, other alternatives are more appropriate for this community.

From this preliminary analysis, and in order to include a broad range of potential technical options as part of the sample project designs, a borehole with an electromechanical pump and gravity distribution was selected as the first option, followed by boreholes equipped with hand pumps as a second option.

- Option 1 – Borehole with an electromechanical pump and gravity distribution: The first option involves the drilling of one or many positive boreholes in the area and in close proximity to the village, pumping to a reservoir using an electromechanical pump, and gravity distribution. The general system layout and proposed pipeline route is shown in Figure 9, however it could be subject to change depending on the drilling campaign results. This layout was used in Epanet to produce a hydraulic model of the system.

- Option 2 – Boreholes and hand pumps: The second option for the community would be to drill approximately fourteen positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. The use of hand pumps will be conditional on a water quality check and pumping test results.

### 7.5.2 Option 1 – Borehole with electromechanical pump and gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by an electromechanical pump. Specifically this option will comprise the following:

- Borehole;
- Electromechanical pump;
- Controls and pump house;
- Transmission line;
- Reservoir siting and location; and
- Distribution network and standpipes.

**Pipe sizing**

The sizing of the pipes was done at a conceptual design level using Epanet. The transmission lines from the boreholes to the reservoir have a diameter of 72 mm, while the first section of the distribution main between the reservoir and the first break pressure tank (BPT) has a diameter of 90 mm. The distribution main is then reduced to a diameter of 72 mm, and secondary branches to other sections of the system and distribution points all have a diameter of 50 mm.

A map of the system is shown in along with preliminary hydraulic calculation results are provided in Figure 9 to 11. The following table provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 7: Summary of pipe length, diameter and recommended material, Calunda**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 72 | 1021 |
| Reservoir – BPT no. 1 | PE or PVC (min. PN 10) | 90 | 1788 |
| BPT no. 1 – BPT no. 2 | PE or PVC (min. PN 6) | 72 | 3244 |
| Distribution lines | PE or PVC (min. PN 6) | 50 | 5937 |
| **TOTAL** | | | **11990** |

**Figure 9: Proposed system layout, Calunda**

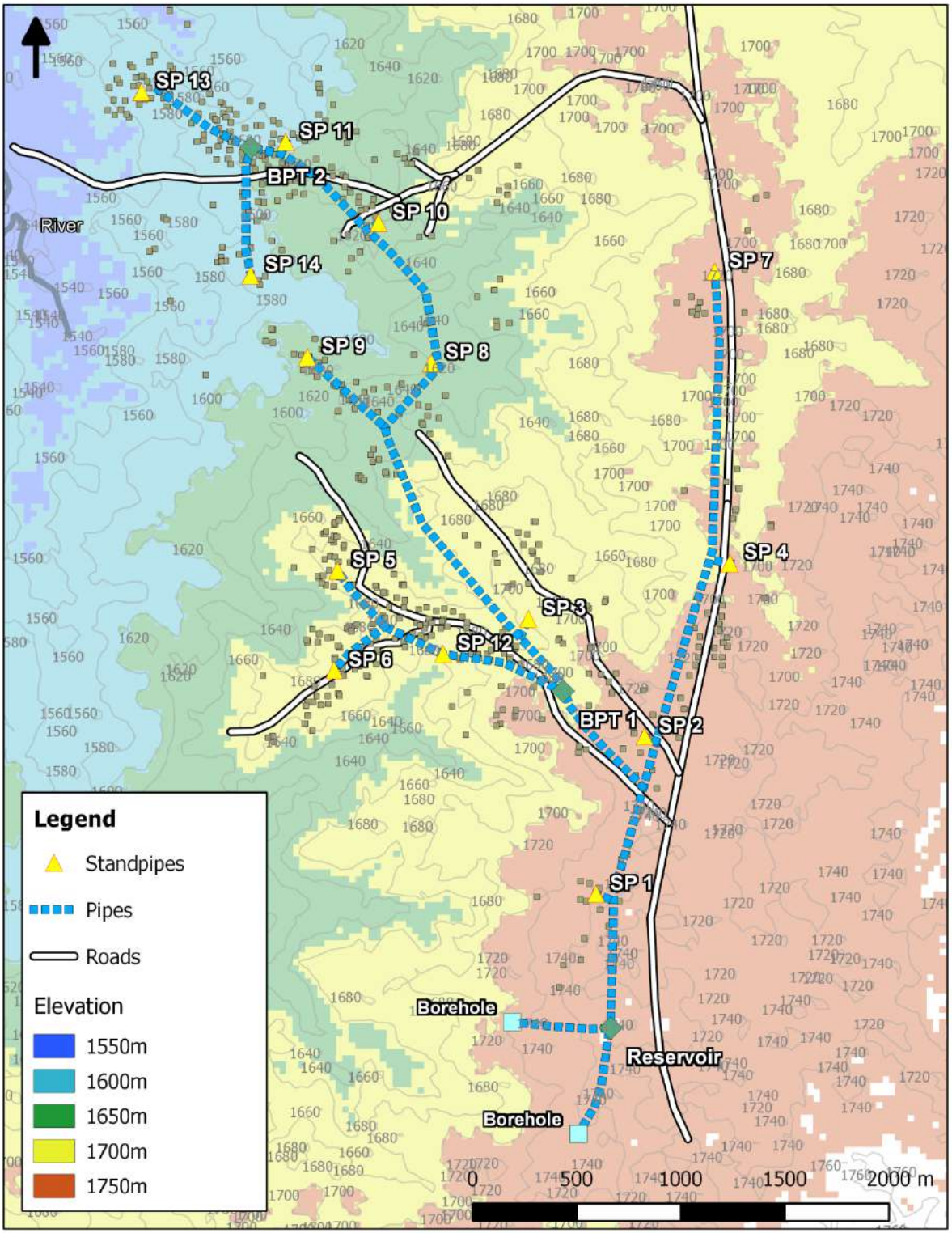


**Figure 10: Pipe dia. & node elevation for Option 1 (electromechanical pump) - Calunda**

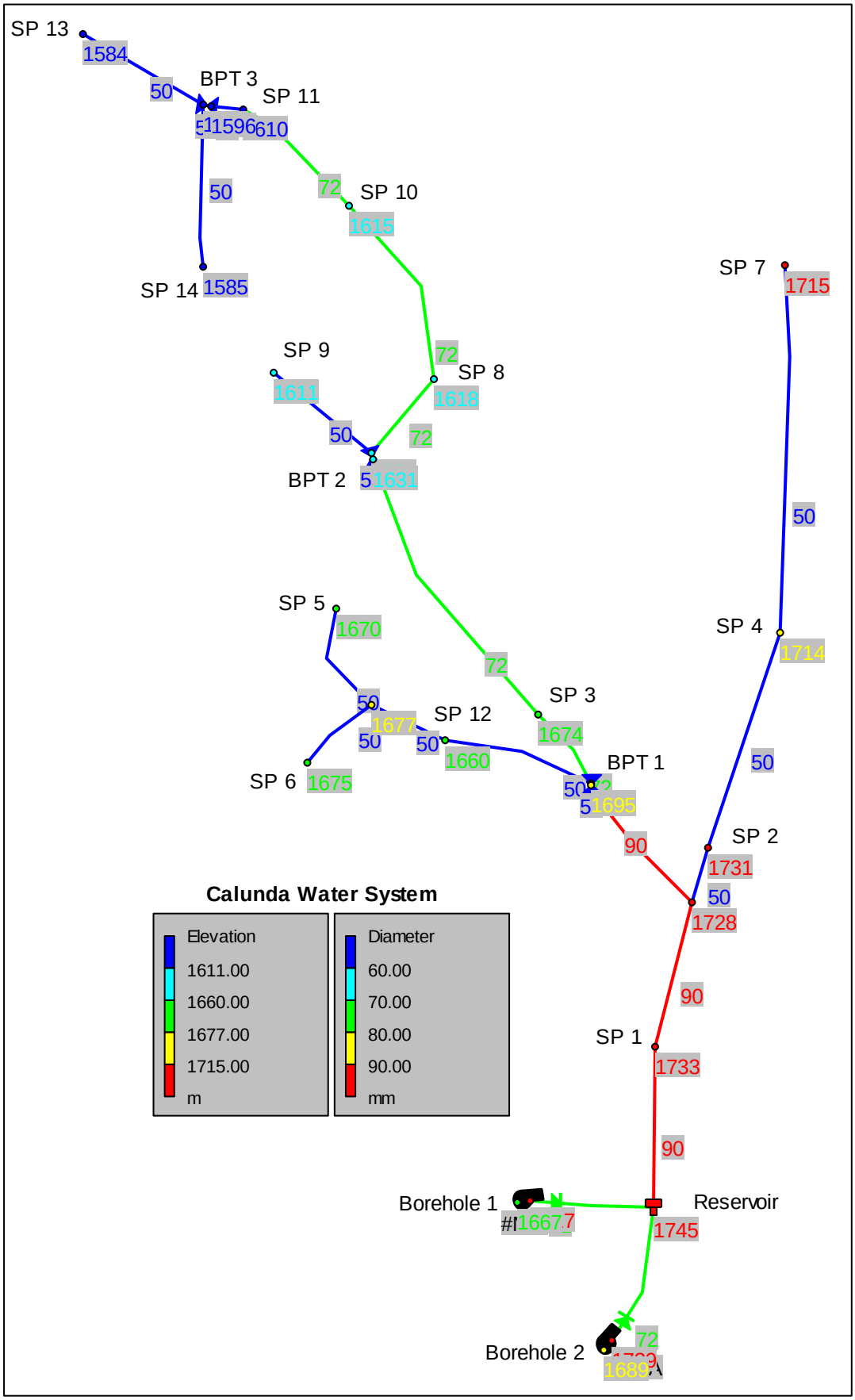
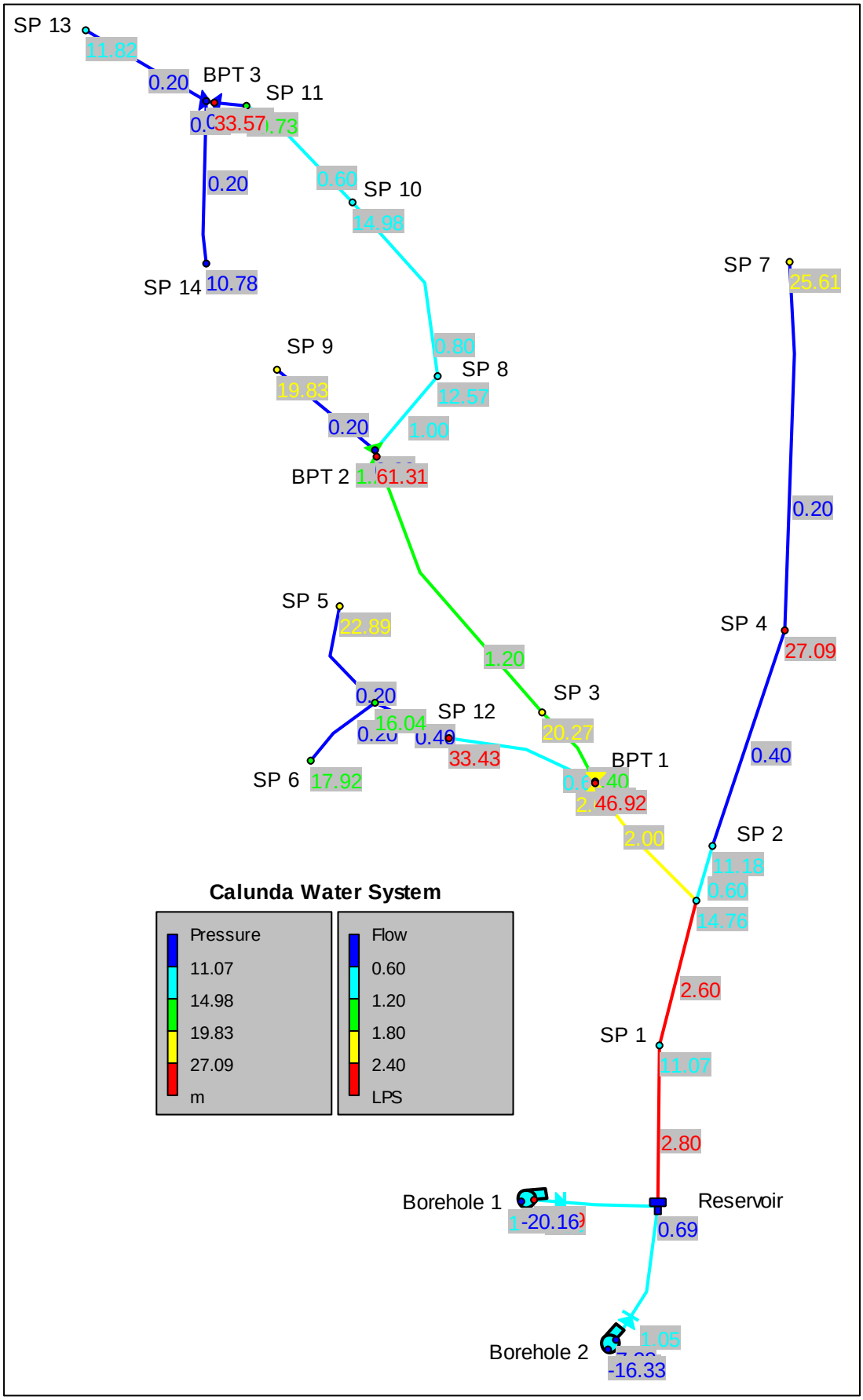


**Figure 11: Flow and Node Pressure for Option 1 (electromechanical pump) - Calunda**



**Reservoir sizing**

The electromechanical pump delivers water to the main reservoir during an estimated 16 hours per day at a steady flow which corresponds to the volume of the total daily demand for the community. The main reservoir delivers water to the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 in the night to 5:00 in the morning.

A design volume of 60 $m^3$ is recommended for the main reservoir, which corresponds to the suggested 40% of total daily peak consumption in the community. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

### 7.5.3 Option 2 – Boreholes and Hand Pumps

**Design criteria**

The following design considerations were used to determine the approximate number and location of water points required to meet demand in the targeted community. Design parameters and assumptions presented in this chapter follow DNAAS standards. The following are the key design parameters used:

- Average water demand in the community (see Section 4); and
- Average distance to water point.

Based on this, fourteen boreholes and hand pumps are required.

**Technology description**

Section 3 of this report describes borehole and hand pump water systems in general, which includes:

- Borehole design and construction;
- Provision and installation of hand pumps;
- Related civil works such as aprons, drainage, washbasins, etc.; and
- Borehole siting.

**Water point siting**

Suggested locations for the fourteen water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. For this technology option, the approximate location of boreholes would match the location of water distribution points (standpipes) shown in Figure 9. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

## 7.6 Costs

The investment and O&M costs for each of the design options are included in Table 8. The costs are based on the design population and the unit costs calculated for the specific type of system. **A description of how the unit costs were developed is included in the NRWSSP Phase 2 Report.** The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 8: Investment and O&M costs - Calunda**

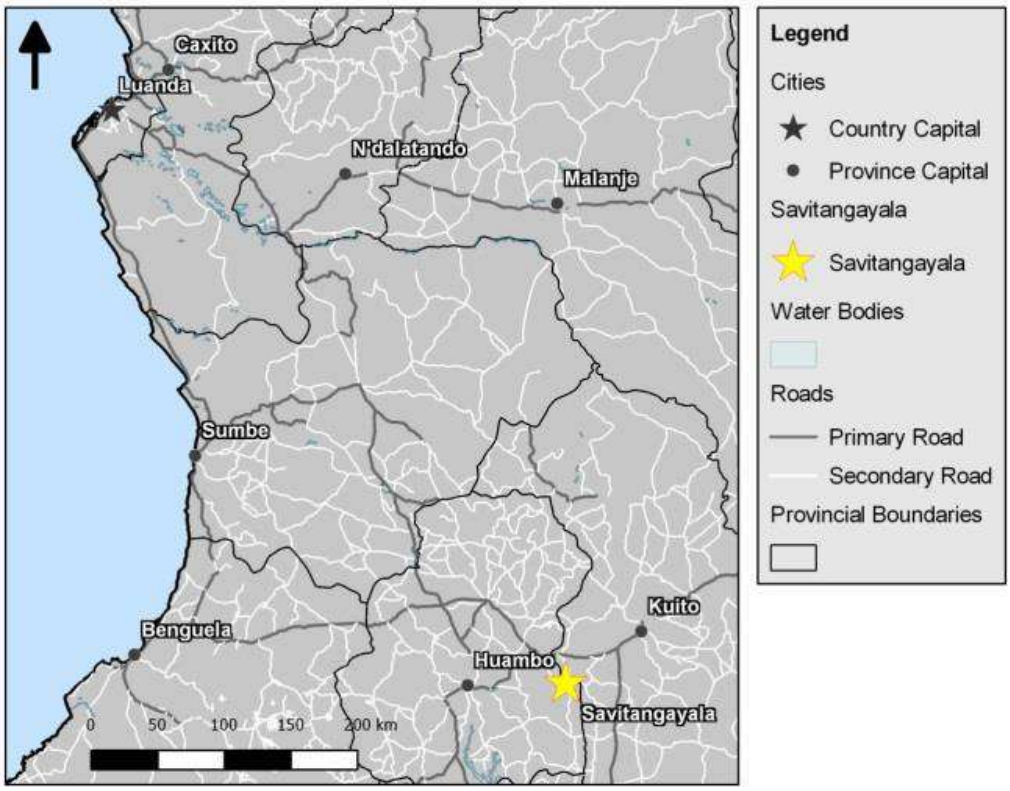
| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Borehole / electromech. pump / piped dist. | 1 | 3,499 | 150.15 | 525,400 | 7.90 | 27,600 |
| 2) Borehole / Handpump | 14 | 3,499 | 68.45 | 3,353,100 | 1.78 | 87,200 |

# 8 CONCEPTUAL DESIGN FOR SAVITANGAYALA, HUAMBO PROVINCE

## 8.1 Community description

The village of Lepi is located in the aldeia of Savitangayala, commune of Cinhama, municipality of Cachiungo, province of Huambo (codes; Lunda Sul 100101, Cachiungo 100501, Chinhama 100503). The community is located at coordinates -12.500415, 16.026773 (latitude, longitude), approximately 85 km east of Huambo (Refer to map – Figure 12).

**Figure 12: Location of Savitangayala in the Province of Huambo, Angola**




The population was estimated at 1,290 people during the field visits. Like the other community visited in the province of Huambo, the population in Savitangayala is spread over a large area (refer to photos – Figure 14). Few small clusters of houses are found and there is a lot of space between each house. The community has two schools and two churches, one catholic and one protestant, each located at opposite ends of the village. The school near the health center is also used as a church. The local crops cultivated include casaba, beans, some vegetables (tomatoes and onions), and occasionally crops will be traded for other goods if the yields are acceptable.

The region has a mix of dense vegetation and clear land, with small streams and springs that could be used for water supply. The good water availability also indicates that groundwater could be considered. One spring that could be used for a water system was identified in the area and will be described in more detail in Section 8.3.

The population is currently using improved and unimproved water sources (including seasonal springs), a borehole equipped with a hand pump and a surface stream for their

water needs. Estimates place the percentage of households with latrines at about 80% with a small portion of the population practicing open defecation. Cases of diarrheal disease occur in the community. Figure 13 shows the location of the various water sources and community infrastructure on an elevation basemap.

**Figure 13: Savitangayala on elevation contour basemap[4]**

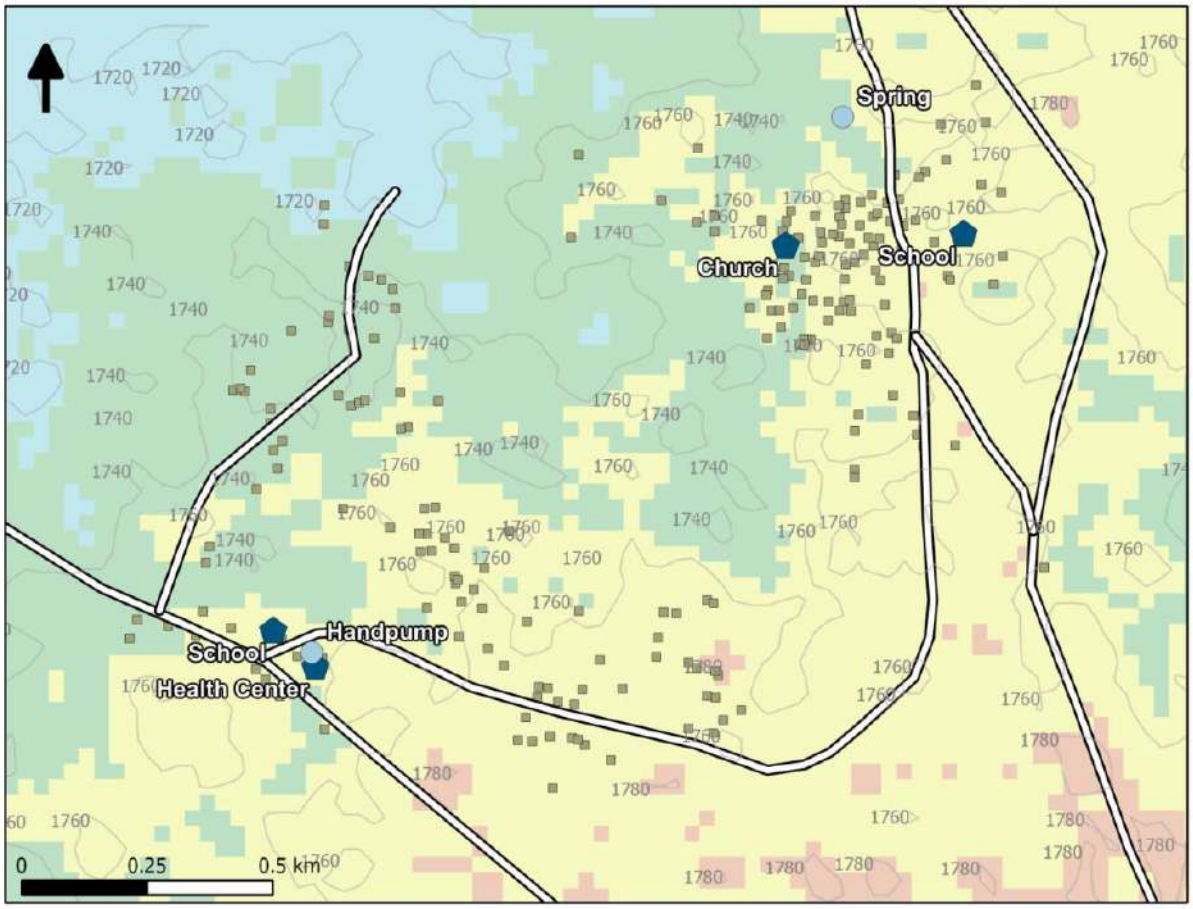



**Figure 14: Houses in Savitangayala (indicating the low population density)**

[4] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

## 8.2 Population

### 8.2.1 Demographics

As part of the study the field team visited a total of 24 households for socio-economic surveys in the community. The average household size is 7.9, with an average of 4.0 children under the age of 15, 1.1 females over the age of 15 and 1.1 males over the age of 15.

As part of the study in the village the field team visited 25 of a total of 442 households, which corresponds to a sampling rate of 5.7%.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity with 50% (12 out of 24), followed by informal business with 29% (7 out of 24), health with 13% (3 out of 24) and lastly education with 4% (1 out of 24).

### 8.2.2 Population estimate

A house counting from satellite photos indicated 213 households for the community. This is in line with the population estimate of 1,290 that was done during field visits (Refer to Table 9).

**Table 9: House counting summary (Savitangayala)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Savitangayala | 213 | 6 | 1,278 |

## 8.3 Existing water supply & sanitation situation

### 8.3.1 Water supply

**Current situation**

There is one improved spring catchment which consists of a small concrete box with three outlets and a drain pipe. It was built by a local NGO CICV in 2004. Two of the original three outlets are broken and were plugged, and users also block the drainage to use the box as a washing basin.

A hand pump was also installed to serve both the school and the health center, with the cooperation of the local municipality and the Ministry of Health and Education. Photos of both systems are shown in Figure 15.

Moreover, several hand dug wells were identified. The population is currently using those improved and unimproved sources for their water needs. Discussions with health personnel indicate that diarrheal cases and malaria are prevalent. This problem is exacerbated during the rainy season when water quality at these sources deteriorates due to surface runoff, thereby increasing the incidence of these health problems. It was also reported that during the dry season some of these sources tend to dry up, leading to problems of water scarcity. Finally, it appears that animals at times share these same water sources, which represents a serious risk for human consumption.

**Figure 15: Spring catchment box (left) and the hand pump (right) in Savitangayala**

Overall, findings suggest that 25% (6 out of 24) of the population consumes unfit water from springs, followed by 33% (8 out of 24) from streams, and the remaining 42% (10 out of 24) collect water from small dug wells along the streams. Responses regarding the treatment of water at home revealed that 83% (20 out of 24) do not use any form of treatment, while the remaining 17% (4 out of 24) use some form of treatment before drinking.

**Water sources**

As mentioned previously, one spring was identified during the field visit but it is already capped and currently in use by the community. Early estimates indicate that the yield of this specific spring would not be enough to be used as a main supply for a community system.

The local leader (soba) indicated that there are other springs in the area, but they could not be visited due to a lack of time and the distance from the community (2 to 3 km). The presence of these springs and wells in the community indicate that the groundwater table is fairly high in the area.

### 8.3.2 Sanitation

In many rural areas such as Savitangayala sanitation remains a huge impediment to health of the inhabitants, mainly because: 1) many households do not have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing in the area.

Households consulted during the field visits tended to claim that open defecation does not occur, however survey results indicate that 21% (5 out of 24) of homes practice open defecation while the remaining 79% (20 out of 24) use a family latrine. This situation,

coupled with the quality of water at the unimproved water points currently in use explains the prevalence of diarrheal cases in the community.

### 8.3.3 Gender and walking distance

Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 83% (20 out of 24) of households surveyed, while for 17% (4 out of 24) of households fetching water was stated to be a girls' responsibility and finally 0% indicated that water collection can be done by all members. These results validate the fact that fetching water is a female responsibility according to local customs and practices.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that households spend less than an hour per day fetching water, as they have to walk over 500 m twice per day.

### 8.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 1.12 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would be willing to pay more for improved water supply. It is also estimated that households spend an average of USD 84.00 per month excluding expenditure on water.

Focus groups confirm these results, indicating the community would be willing to pay at least USD 1.12 per $m^3$ for improved water services. However, many still have the perception that water is a right and it should not be priced.

## 8.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in Section 4 – Design guidelines. The design parameters for Savitangayala are presented in Table 10.

**Table 10: Water demand calculation, Savitangayala**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Population** | | |
| Current population | persons | 1300 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 1717 |
| **Daily consumption** | | |
| Population served | persons | 1717 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | $m^3$/day | 51.50 |
| **Physical losses** | | |
| Physical losses | % of daily demand | 10% |
| Physical losses | $m^3$/day | 5.15 |

**Table 10: Water demand calculation, Savitangayala**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Water demand** | | |
| Total average daily demand | $m^3$/day | 56.65 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |
| Daily Peak Demand | $m^3$/day | 73.65 |
| Hourly Peak Demand | $m^3$/day | 113.30 |
| Hourly Peak Demand | L/s | 1.31 |
| **Number of standpipes** | | |
| Number of persons per standpipe | persons | 250 |
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 6.9 |
| Number of standpipes (rounded) | - | 7 |
| Design flow per standpipe | L/s | 0.19 |
| **Design flow at outlets** | | |
| Design flow with hourly peak factor | L/s | 0.19 |
| Design flow without hourly peak factor | L/s | 0.09 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.19 L/s, and the daily average flow is 0.09 L/s. These values will be used in the Epanet hydraulic simulations for sizing the system.

## 8.5 System design

### 8.5.1 Review of technical options

Given the various sources investigated during the field mission, it was decided that no nearby springs could be used as a source for the system. The different options that can then be considered for water supply in Savitangayala include:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements.
- *Gravity distribution:* Most households are higher in elevation than the spring identified; therefore a gravity-fed piped system is not technically feasible. Yield is also not sufficient.
- *Ram pump with gravity distribution:* Water from the spring can be pumped using a ram pump to a delivery tank from which water is distributed by gravity, however the yield of the spring identified is too low.
- *Borehole with electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, subject to availability of electricity.
- *Solar pump with gravity distribution:* Technically feasible, from a borehole since the flow rate at the spring catchment already identified is too low.
- *Surface water with pump, treatment and piped distribution*: Although there are streams in the area, other alternatives are more appropriate for this community.

From this preliminary analysis, and in order to include a broad range of potential technical options as part of the sample project designs, a solar pump system with gravity distribution was selected as the first option, followed by boreholes and hand pumps as second option.

- Option 1 – Solar pump and gravity distribution: The first option involves the drilling of one or several positive boreholes in the area and in close proximity to the village, pumping to a reservoir using a solar powered pump, and gravity distribution. The general system layout and proposed pipeline route is shown in Figure 16, however it could be subject to change depending on the drilling campaign results. This layout was used in Epanet to produce a hydraulic model of the system.
- Option 2 – Boreholes and hand pumps: The second option for the community would be to drill approximately seven positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. The use of hand pumps will be conditional to a water quality check and pumping test results.

### 8.5.2 Option 1 – Solar pump with gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by a solar pump. Specifically this option will comprise the following:

- Borehole (including protection);
- Submersible pump;
- Solar panel array, rack and controls;
- Transmission line;
- Reservoir siting and location; and
- Distribution network and standpipes.

**Pipe sizing**

The sizing of the pipes was calculated at a conceptual design level using Epanet. The main distribution lines have a diameter of 72 mm, until the distribution branches off to standpipes and sub-sections with a pipe diameter of 50 mm. A map of the system along with preliminary hydraulic calculation results are provided in Figures 16 to 18. The following table (Table 11) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 11: Summary of pipe length, diameter and recommended material (Savitangayala)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 90 | 15 |
| Main distribution lines | PE or PVC (min. PN 6) | 72 | 2423 |
| Secondary distribution lines | PE or PVC (min. PN 6) | 50 | 1315 |
| TOTAL | | | 3753 |

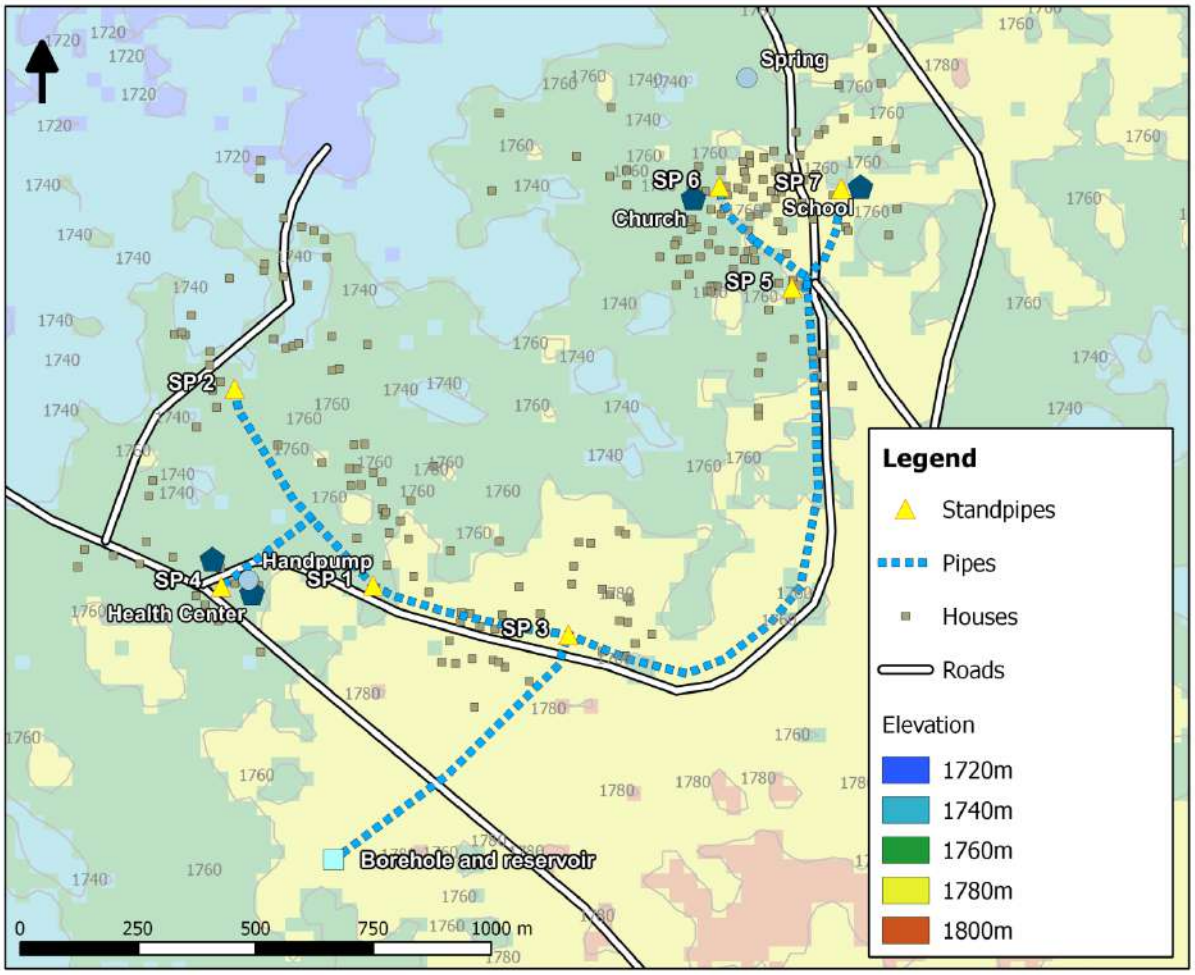
**Reservoir sizing**

The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow which corresponds to the volume of the total daily demand for the community. The main reservoir delivers water to the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 to 5:00.

The reservoir volume was determined through hydraulic simulations for system balance. A design volume of 42 $m^3$ is recommended for the main reservoir, which is higher than the suggested 40% of total daily peak consumption in the community, but provides extra water

storage accounting for the fact that time available for solar pumping during the day is limited. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

**Figure 16: Proposed system layout (Savitangayala)**




### 8.5.3 Option 2 – Boreholes and hand pumps

**Design criteria**

The following design considerations were used to determine the approximate number and location of water points required to meet demand in the targeted community. Design parameters and assumptions presented in this chapter follow DNAAS standards. The following are the key design parameters used:

- Average water demand in the community (see Section 4); and
- Average distance to water point.

Based on this a total of seven boreholes with hand pumps are recommended.

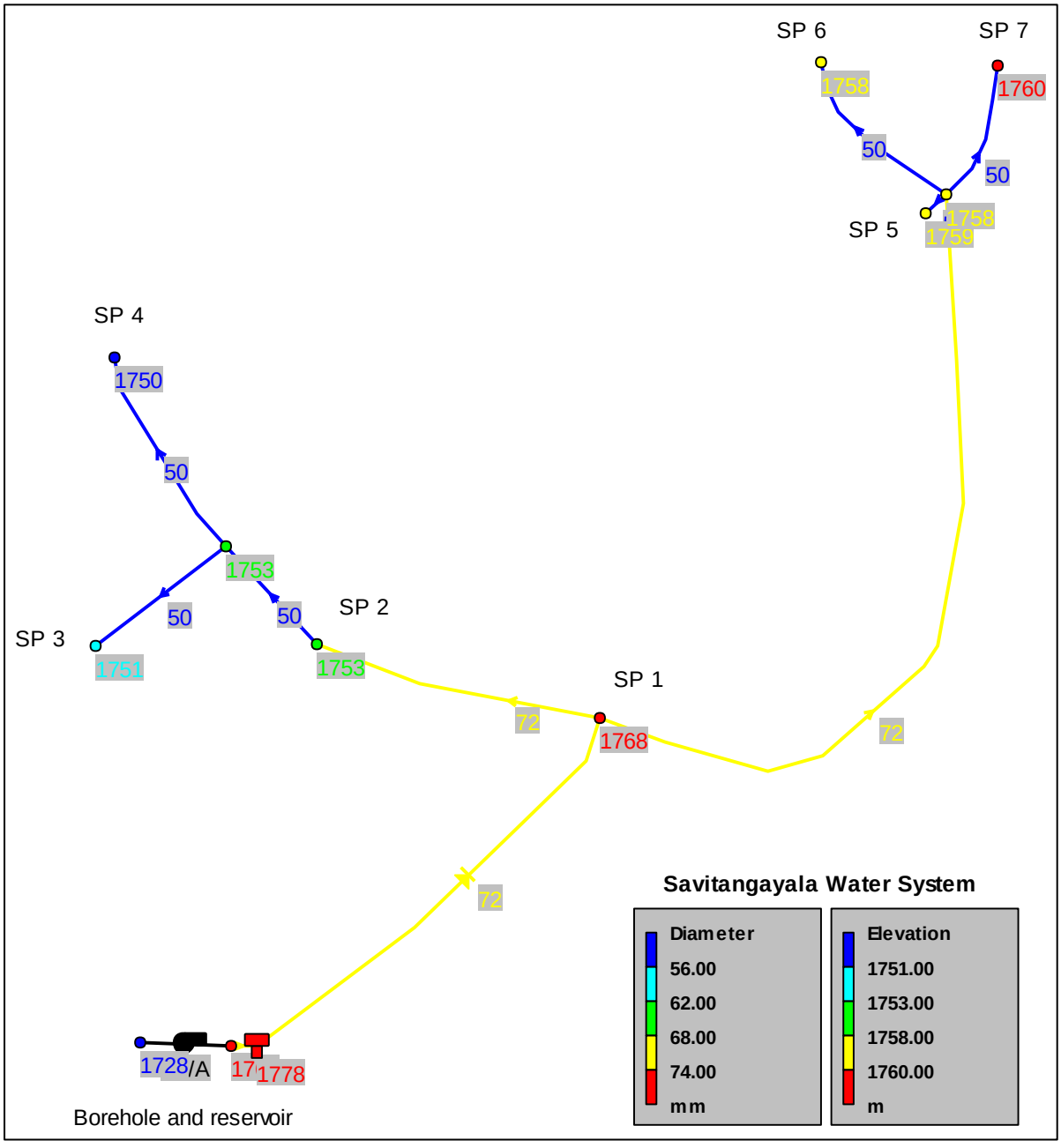
**Technology description**

Section 3 of this report describes borehole and hand pump water systems in general, including:

- Borehole design and construction;
- Provision and installation of hand pumps;

- Related civil works such as aprons, drainage, washbasins, etc.; and
- Borehole siting.

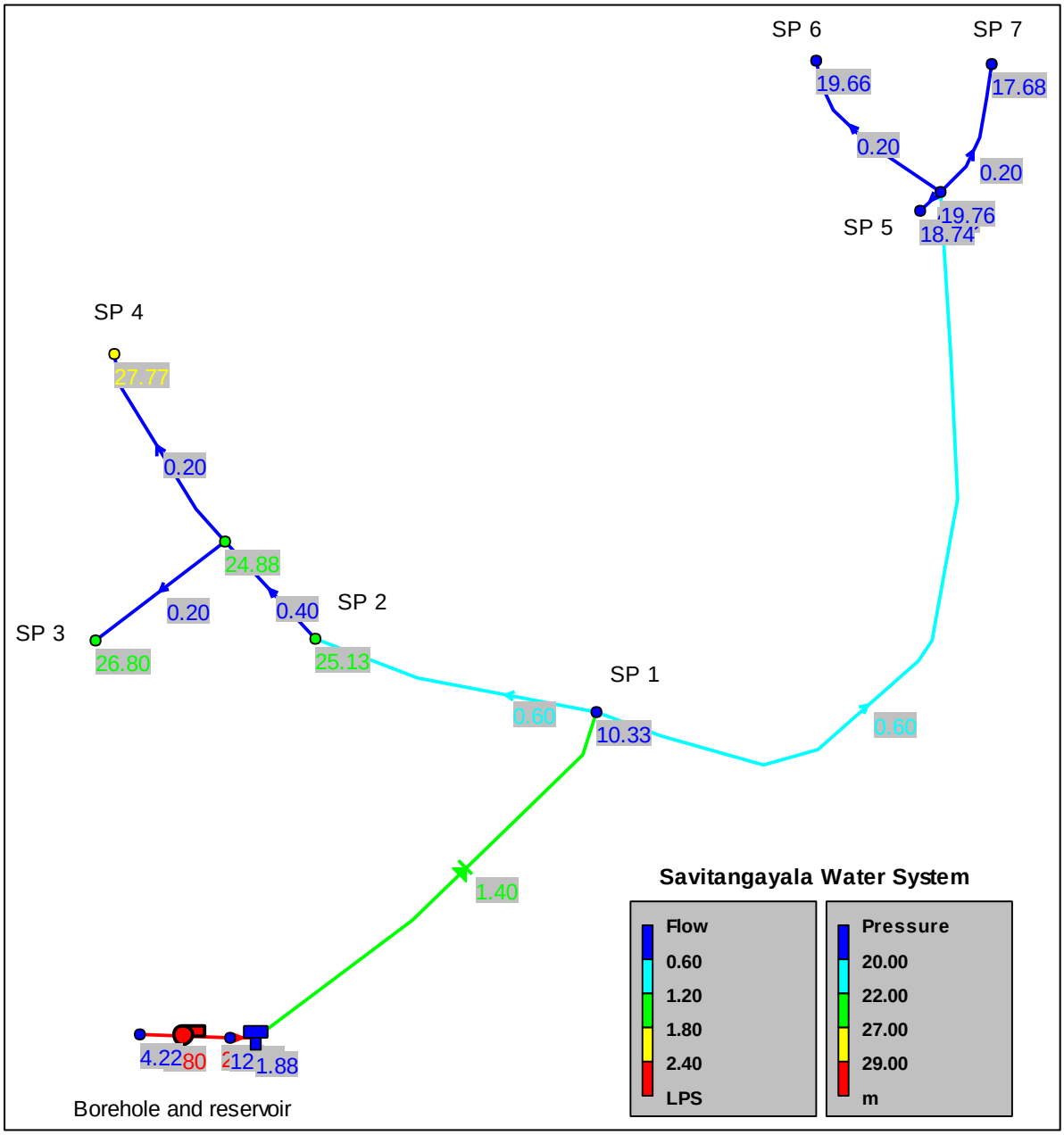
**Figure 17: Pipe diam. & node elevation for Option 1 (solar pump) - Savitangayala**




## Water point siting

Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. For this technology option, the approximate location of the seven boreholes would match the location of water distribution points (standpipes) provided in Figure 16. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

**Figure 18: Flow and node pressure for Option 1 (solar pump) - Savitangayala**




## 8.6 Costs

The investment and O&M costs for each of the design options are included in Table 12. The costs are based on the design population and the unit costs calculated for the specific type of system. **A description of how the unit costs were developed is included in the NRWSSP Phase 2 Report.** The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 12: Investment and O&M costs - Savitangayala**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Borehole / solar pump / piped dist. | 1 | 1,717 | 153.65 | 263,800 | 5.11 | 8,800 |
| 2) Borehole / Handpump | 7 | 1,717 | 68.45 | 822,700 | 1.78 | 21,400 |

# 9 CONCEPTUAL DESIGN FOR MATXISENGUE, LUNDA SUL PROVINCE

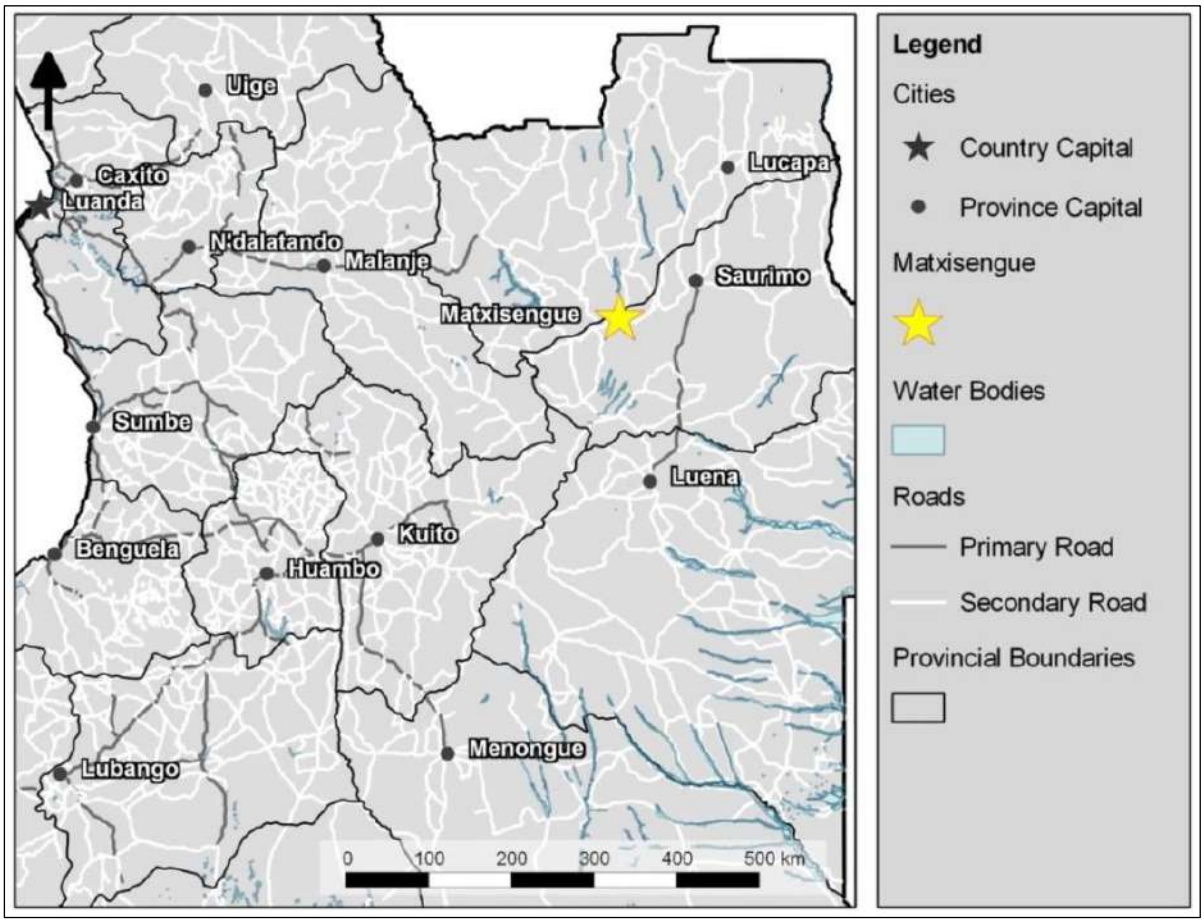
## 9.1 Community description

Matxisengue is a village/aldeia in the commune of Kacolo, municipality of Kacolo, province of Lunda Sul (codes unavailable). The community is located at coordinates -10.03014, 19.54892 (latitude, longitude), approximately 35 km east of Cacolo and 105 km southwest of Saurimo, the provincial capital of Lunda Sul (refer to Figure 19).

The population was estimated at 1,500 people during the field visits. The school, health center and churches were also identified during the visit. Informally, community members organized an informal market on the east side of the settlement, on the roadside of that main road between Saurimo and Cacolo. The village, founded in the early 1800s, sits on top of a small hill with houses spread in an irregular pattern. Moreover, the local King belonging to the sub-tribe of Dembos resides in the community.

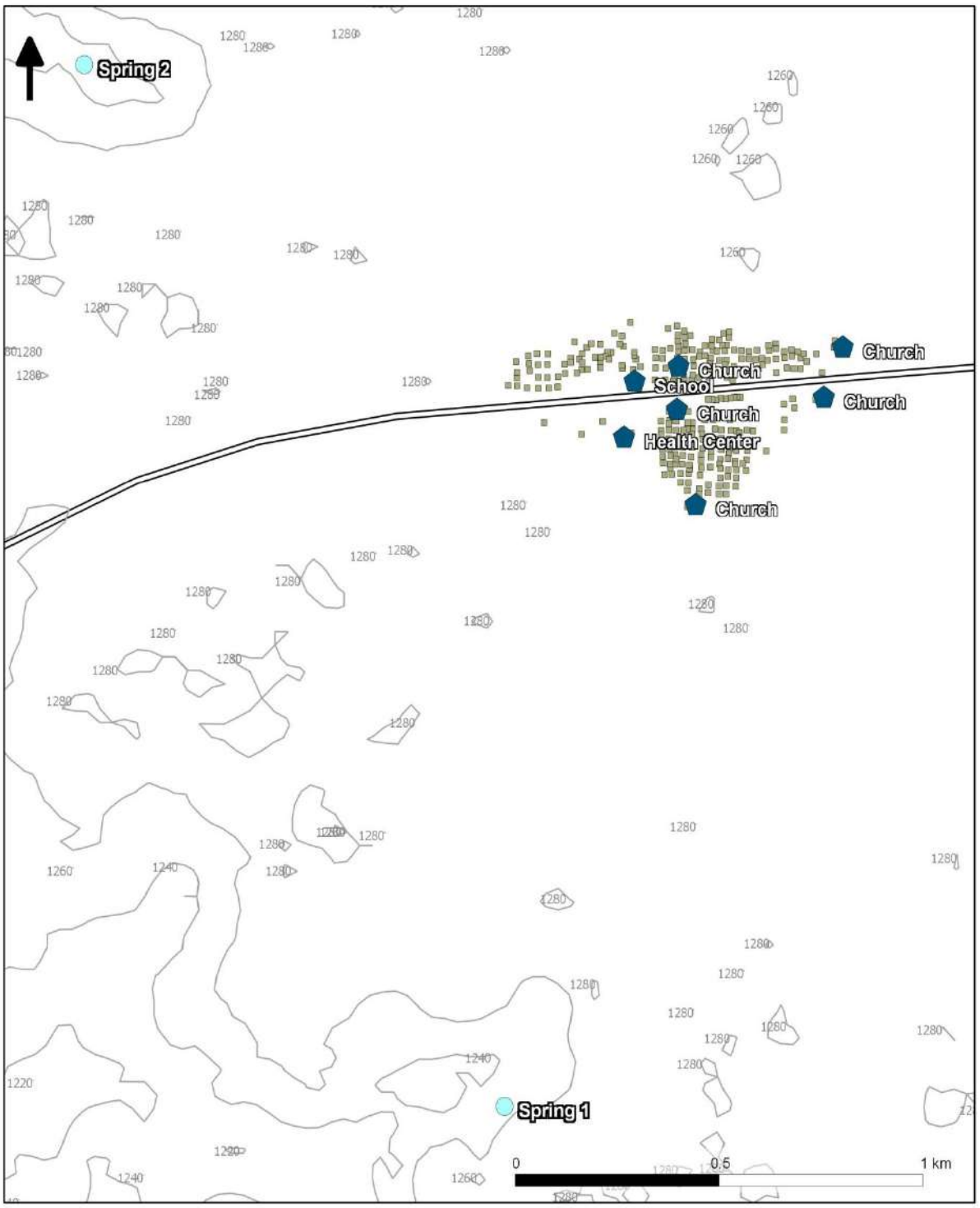
The region has a mix of dense vegetation and clear land, with many small streams and springs that could be used for water supply. The good water availability also indicates that groundwater could be considered. Two springs that could be used for a water system were identified in the area and will be described in Section 9.3.1. Refer to Figures 20 and 21.

**Figure 19: Location of Matxisengue in the Province of Uige, Angola**



The population is currently using several unimproved water sources (including many seasonal springs) and a surface stream for their water needs. Estimates place the percentage of households with latrines at less than 10% with a large portion of the population practicing open defecation. Cases of diarrheal disease occur in the community.

**Figure 20: Matxisengue on elevation contour basemap[5]**




[5] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

**Figure 21: An unfinished pipe stand and broken hand pump (left) and a new health clinic constructed in 2012 (right) in Matxisengue**

## 9.2 Population

### 9.2.1 Demographics

The field study conducted in the village visited 80 of a total of 250 households, which corresponds to a sampling rate of 32%. The average household size is 3.46, with an average of 2.0 children under the age of 15, 0.8 females over the age of 15 and 0.7 males over the age of 15.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity with 84% (67 out of 80), followed by informal business with 8% (6 out of 80), education with 4% (3 out of 80), formal business with 3% (2 out of 80) and finally construction and public administration with approximately 1% both.

### 9.2.2 Population estimate

A house counting from satellite photos indicated 275 households for the community. This is in line with the population estimate of 1,500 that was done during field visits. Refer to Table 13.

**Table 13: House Counting Summary (Matxisengue)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Matxisengue | 275 | 6 | 1,650 |

## 9.3 Existing water supply & sanitation situation

### 9.3.1 Water supply

**Current situation**

There is currently no water supply infrastructure functioning in the area surrounding Matxisengue. A contractor started installing a solar water supply system in the period 2008-2009, but never completed the works. This system source was the spring located to the north of the community, however it seems that the spring was chosen based on its immediate accessibility rather than the available yield and water quality. Three public

standpipes have been constructed but they are not connected to any system, and there is a pile of construction materials left by the contractor (mostly PVC pipes). See Figure 22.

**Figure 22: Second unfinished pipe stand (left) and broken handpump (right) in Matxisengue**

A local NGO also installed a hand pump in the community a few years ago, but a breakdown occurred after six months and the pump was never repaired. Refer to Figure 23.

**Figure 23: Broken hand pump (Matxisengue)**

Two main springs that could be used for a water system are described in this report. According to its location, general water quality and quantity, and consultation with the community, one spring was identified to supply the system in case the option chosen involves a spring catchment. Additional small springs are present as well as a river.

The population is currently using those unimproved water sources (springs) and a surface stream for their water needs. Discussions with health personnel indicate that diarrheal cases and malaria are prevalent. This problem is exacerbated during the rainy season when water quality at these sources deteriorates due to surface runoff, thereby increasing the incidence of these health problems. It was also reported that during the dry season some of these sources tend to dry up, leading to problems of water scarcity. Finally, it appears that animals at times share these same water sources, which represents a serious risk for human consumption.

Overall, findings suggest that 100% (80 out of 80) of the population consumes unfit water mostly from the river or the springs. Responses regarding the treatment of water at home revealed that 100% (80 out of 80) do not use any form of treatment.

**Water sources**

As mentioned previously, there are two key springs in the surroundings of the Matxisengue community. Refer to map (Figure 20) for their location and Figure 24 for photos.

*Spring 1:* Spring 1 is located approximately 2 km south of the community. Estimates indicate a flow of approximately 2.5 L/s, and the water quality seems good upon inspection. It is

currently used for drinking water, despite the distance from the village. It is worth noting that community members tried to improve the catchment by their own means by installing an intake pipe (probably taken from the pile of materials left by the contractor four years ago).

*Spring 2:* Spring 2 is located approximately 1 km north-west of the village. It is used for multiple purposes by inhabitants of Matxisengue; however the flow and water quality is significantly lower than that of spring 1.

**Figure 24: Spring 1 (left) and Spring 2 (right) in Matxisengue**

### 9.3.2 Sanitation

In many rural areas such as the community of Matxisengue sanitation remains a huge impediment to health of the inhabitants mainly because: 1) many households do not have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing in the area.

Households consulted during the field visits tended to claim that open defecation does not occur, however survey results indicate that 99% (79 out of 80) of homes practice open defecation while the remaining 1% (1 out of 80) use a family latrine. This situation, coupled with the quality of water at the unimproved water points currently in use explains the prevalence of diarrheal cases in the community.

### 9.3.3 Gender and walking distance

Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 39% (31 out of 80) of households surveyed, while 43% (34 out of 80) of households fetching water was stated to be a girls' responsibility and finally 13% (10 out of 80) indicated that water collection can be done by all members. These results validate the fact that fetching water is a female responsibility according to local customs and beliefs.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water

sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that households spend about an hour per day fetching water, as they have to walk over 1.5 km twice per day.

### 9.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 0.17 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would be willing to pay more for improved water supply. Moreover, it is estimated that households spend an average of USD 144.76 per month excluding expenditure on water.

Focus groups suggest that, given these results, the community would be willing to pay at least USD 0.17 per $m^3$ for improved water service. However, many still have the perception that water is a right and it should not be priced.

## 9.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in the body of the main report (Section 4 – Design guidelines). The design parameters for Matxisengue are presented below in Table 14.

**Table 14: Water demand calculation, Matxisengue**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Population** | | |
| Current population | persons | 1500 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 1981 |
| **Daily consumption** | | |
| Population served | persons | 1981 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | $m^3$/day | 59.43 |
| **Physical losses** | | |
| Physical losses | % of daily demand | 10 |
| Physical losses | $m^3$/day | 5.94 |
| **Water demand** | | |
| Total average daily demand | $m^3$/day | 65.37 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |
| Daily Peak Demand | $m^3$/day | 84.98 |
| Hourly Peak Demand | $m^3$/day | 130.74 |
| Hourly Peak Demand | L/s | 1.51 |
| **Number of standpipes** | | |
| Number of persons per standpipe | persons | 250 |
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 7.9 |
| Number of standpipes (rounded) | - | 8 |
| Design flow per standpipe | L/s | 0.19 |
| **Design flow at outlets** | | |
| Design flow with hourly peak factor | L/s | 0.19 |
| Design flow without hourly peak factor | L/s | 0.09 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.19 L/s, and the daily average flow is 0.09 L/s. These values will be used in the Epanet hydraulic simulations.

## 9.5 System design

### 9.5.1 Review of technical options

Given the various sources investigated during the field mission, Spring 1 - located at the south of the village - was selected as the most viable source for supplying a piped system. Various options then exist for the future improvement of water supply in Matxisengue:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements.
- *Gravity distribution:* Most households are higher in elevation than Spring 1, therefore a gravity-fed piped system is not technically feasible.
- *Ram pump with gravity distribution:* Technically feasible. Water from the spring can be pumped using a ram pump to a delivery tank from which water is distributed by gravity.
- *Borehole with electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, and subject to availability of electricity.
- *Solar pump with gravity distribution:* Technically feasible, either from a borehole or from the spring catchment already identified.
- *Surface water with pump, treatment and piped distribution*: Although there are streams in the area, other alternatives are more appropriate for this community.

From this preliminary analysis, and in order to include a broad range of potential technical options as part of the sample project designs, a solar pump system with gravity distribution was selected as the first option, followed by a borehole with an electromechanical pump and gravity distribution as second option.

- Option 1 – Solar pump with gravity distribution: The first option involves the capping of a spring, pumping using a solar powered pump to an elevated reservoir, and gravity distribution. This scenario is conditional to further checks on the spring yield available. The general system layout and proposed pipeline route is shown in Figure 25. This layout was used in Epanet to produce a hydraulic model of the system.
- Option 2 – Borehole with an electromechanical pump and gravity distribution: The second option involves the drilling of a positive borehole in the area and in close proximity to the village, pumping to a reservoir using an electromechanical pump, and gravity distribution. The general system layout and proposed pipeline route is shown in Figure 25 however it could be subject to change depending on the drilling campaign results. This layout was used in Epanet to produce a hydraulic model of the system.

### 9.5.2 Option 1 – Solar pump with gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by a solar pump. Specifically this option will comprise the following:

- Spring catchment box (including protection);
- Submersible pump;
- Solar panel array, rack and controls;
- Transmission line;

- Reservoir siting and location; and
- Distribution network and standpipes.

## Pipe sizing

The sizing of the pipes was done at a conceptual design level using Epanet. For most pipes in the system the minimum diameter of 50 mm has been selected, with the exception of the transmission line at diameter 90 mm and a 72 mm section of distribution line between the reservoir and the village. A map of the system along with preliminary hydraulic calculation results are provided in Figures 25 to 27. The following table (Table 15) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 15: Summary of pipe length, diameter and recommended material (Matxisengue)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 90 | 1450 |
| Distribution lines | PE or PVC (min. PN 6) | 72 | 220 |
| Spring – drive tank, distribution lines | PE or PVC (min. PN 6) | 50 | 994 |
| TOTAL | | | 2664 |

## Reservoir sizing

The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow which corresponds to the total daily demand for the community. The main reservoir delivers water to the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 to 5:00.

The reservoir volume was determined through hydraulic simulations for system balance. A design volume of 40 $m^3$ is recommended for the main reservoir, which is higher than the suggested 40% of total daily peak consumption in the community, but provides extra water storage accounting for the fact that time available for solar pumping during the day is limited. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

**Figure 25: Proposed system layout (Matxisengue) – Options 1 and 2**

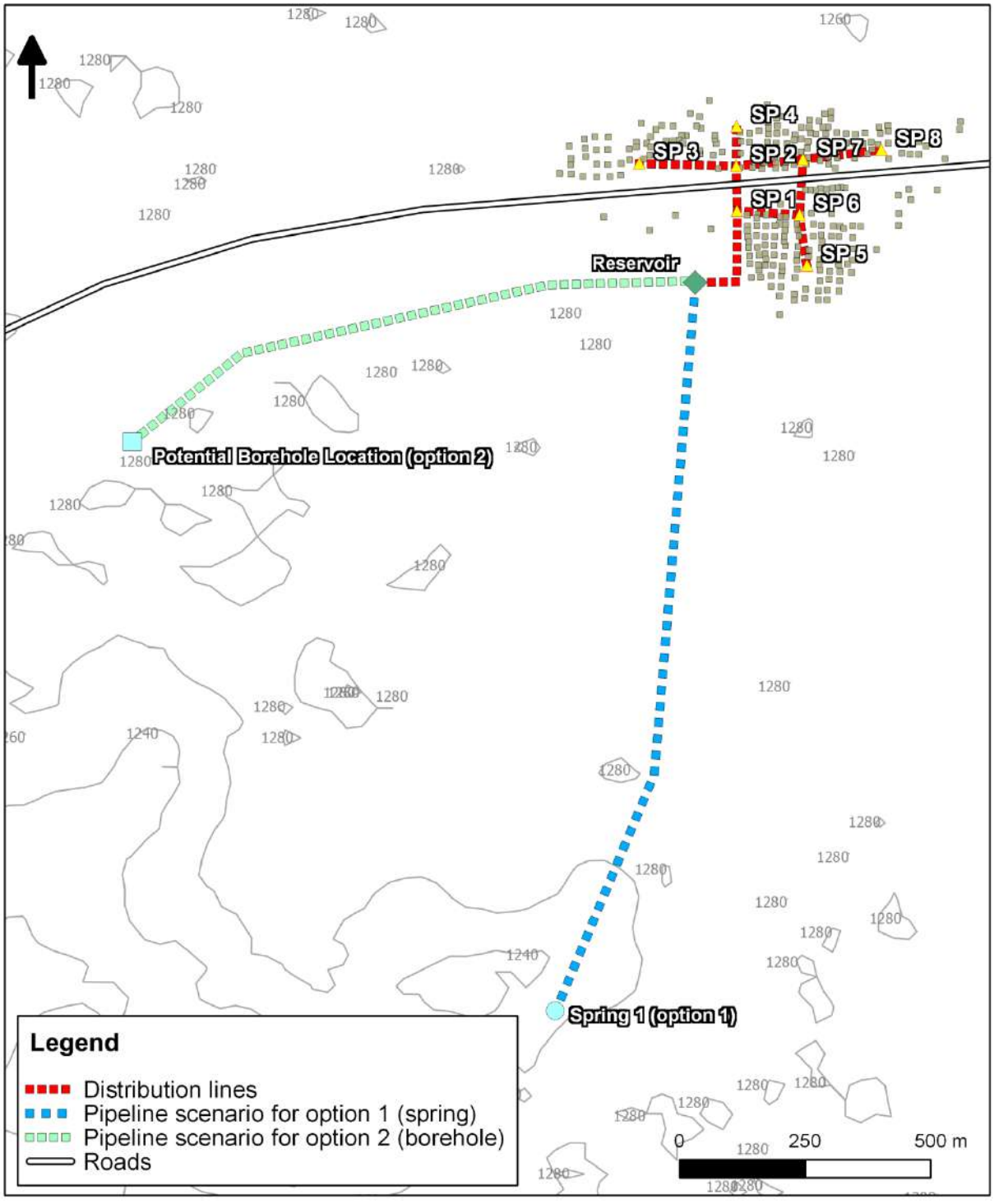


**Figure 26: Diameter and node elevation for Option 1 (solar pump) - Matxisengue**

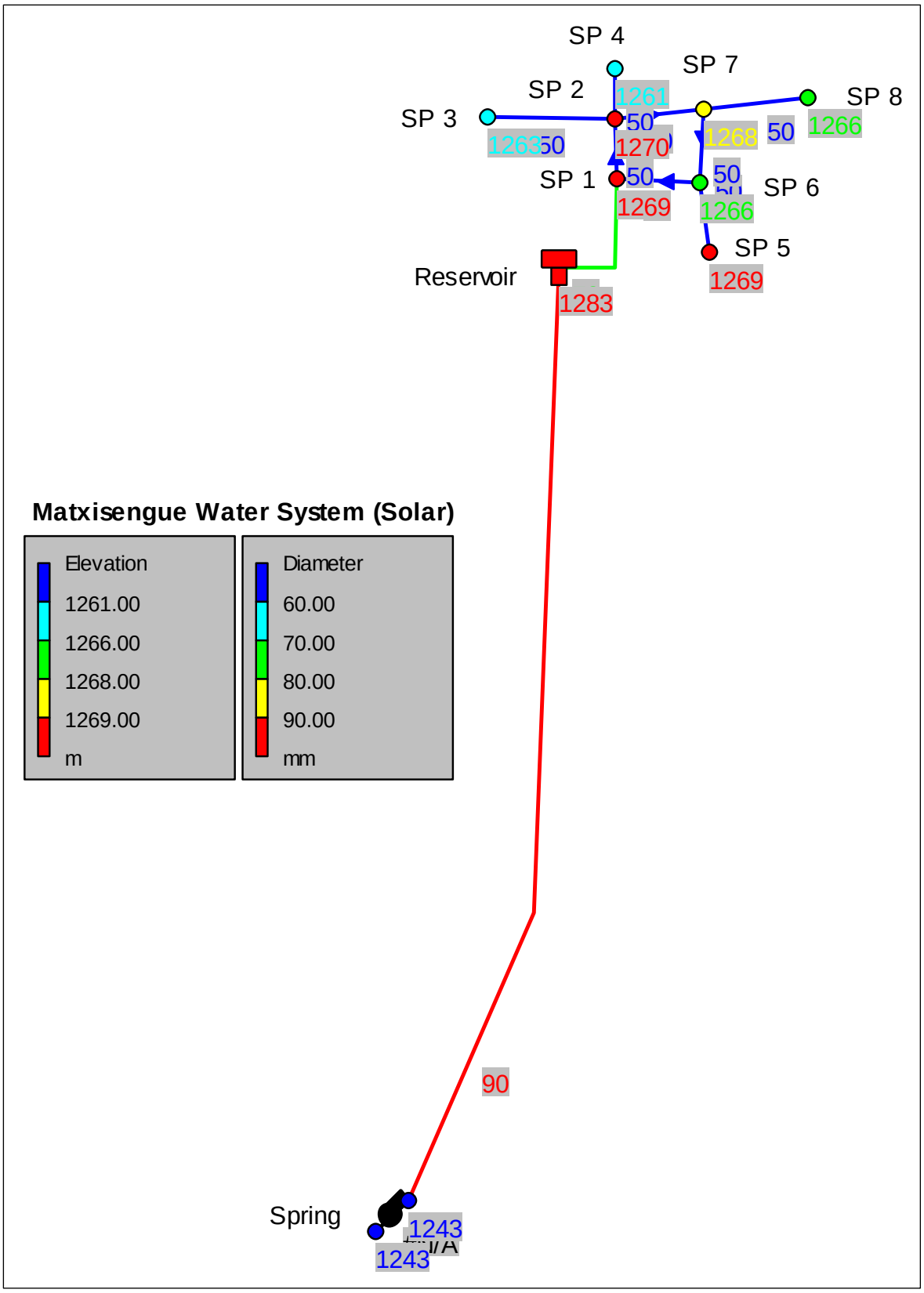
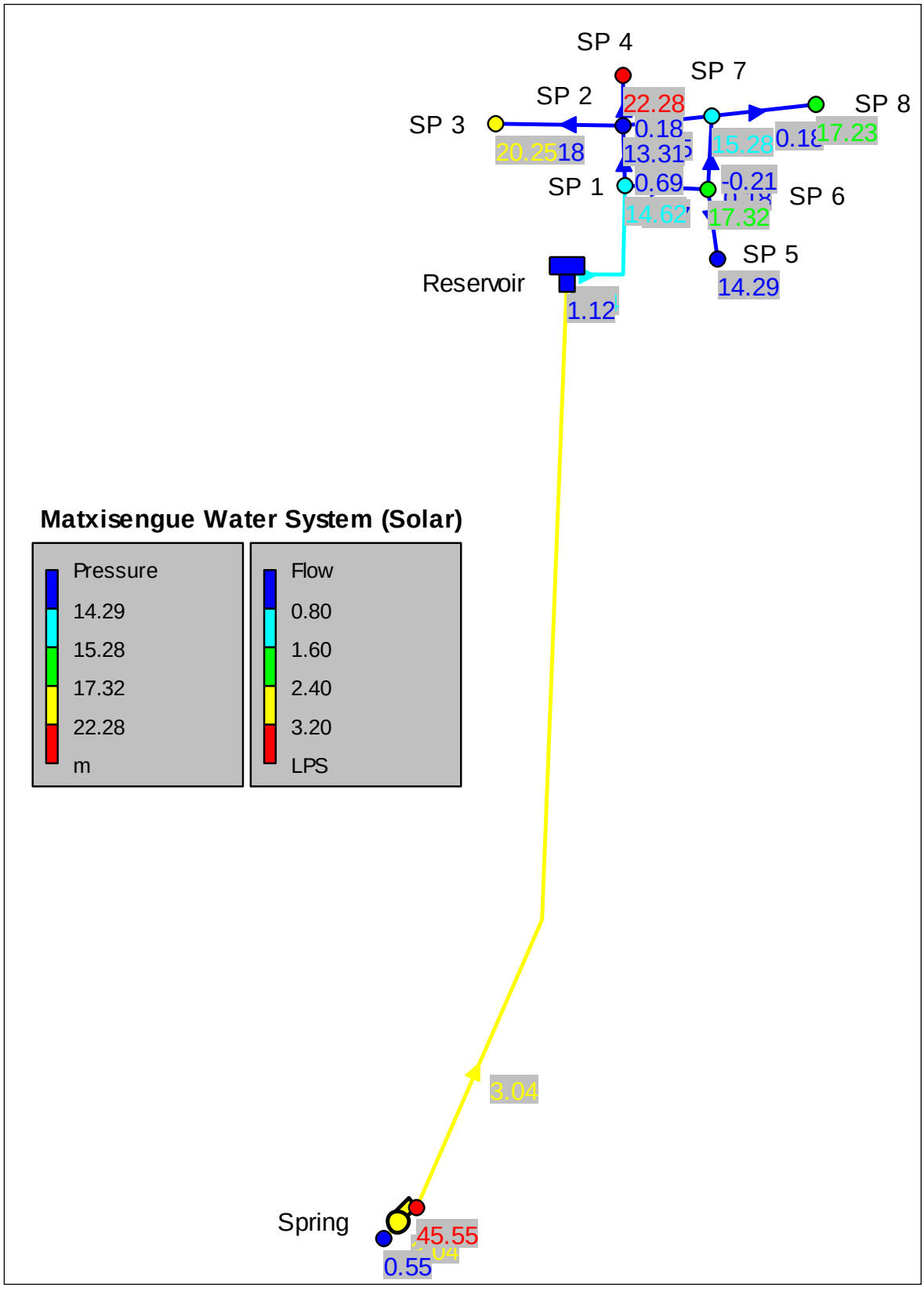


**Figure 27: Flow and node pressure for Option 1 (solar pump) - Matxisengue**



### 9.5.3 Option 2 – Borehole with electromechanical pump and gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by an electromechanical pump. Specifically this option will comprise the following:

- Borehole;
- Electricomechanical pump;
- Controls and pump house;
- Transmission line;
- Reservoir siting and location; and
- Distribution network and standpipes.

**Pipe sizing**

The sizing of the pipes was done at a conceptual design level using Epanet. For most pipes in the system the minimum diameter of 50 mm has been selected, with the exception of the 72 mm transmission line to the reservoir, and another 72 mm section of distribution line between the reservoir and tees that branch off to various distribution points. A map of the system along with preliminary hydraulic calculation results are provided in Figures 25, 28 and 29. The following table (Table 16) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 16: Summary of pipe length, diameter and recommended material (Matxisengue)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 90 | 1121 |
| Distribution lines | PE or PVC (min. PN 6) | 72 | 220 |
| Spring – drive tank, distribution lines | PE or PVC (min. PN 6) | 50 | 994 |
| TOTAL | | | 2334 |

**Reservoir sizing**

The electromechanical pump delivers water to the main reservoir during an estimated 16 hours per day at a steady flow which corresponds to the volume of the total daily demand for the community. The main reservoir delivers water to the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 in the night to 5:00 in the morning.

A design volume of 34 $m^3$ is recommended for the main reservoir, which corresponds to the suggested 40% of total daily peak consumption in the community. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

**Figure 28: Pipe diam. & node elevation for Option 2 (electromechanical pump) - Matxisengue**

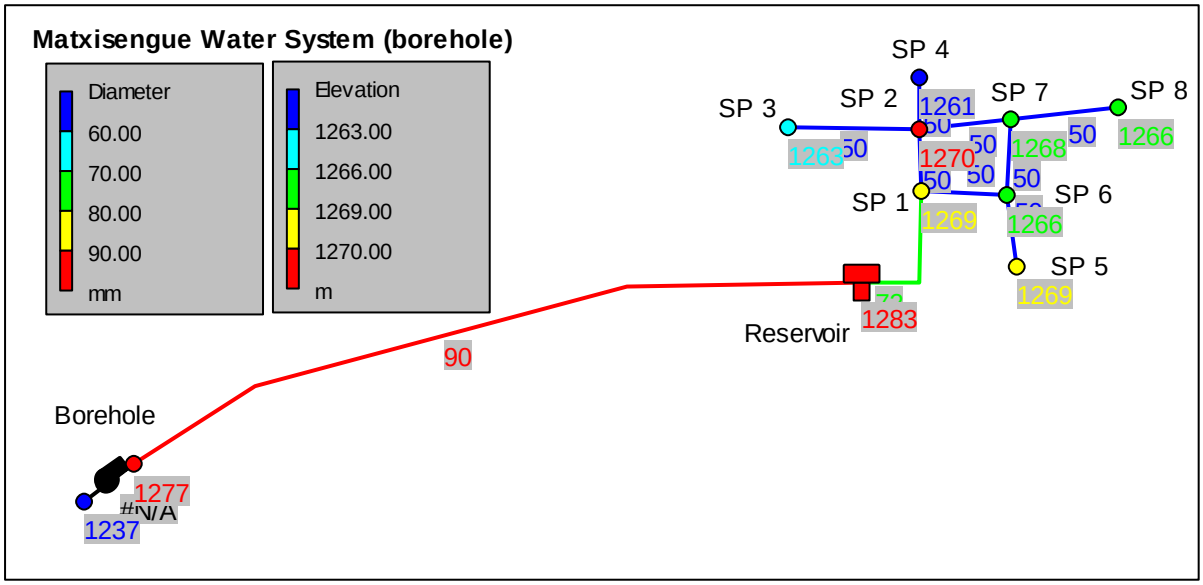
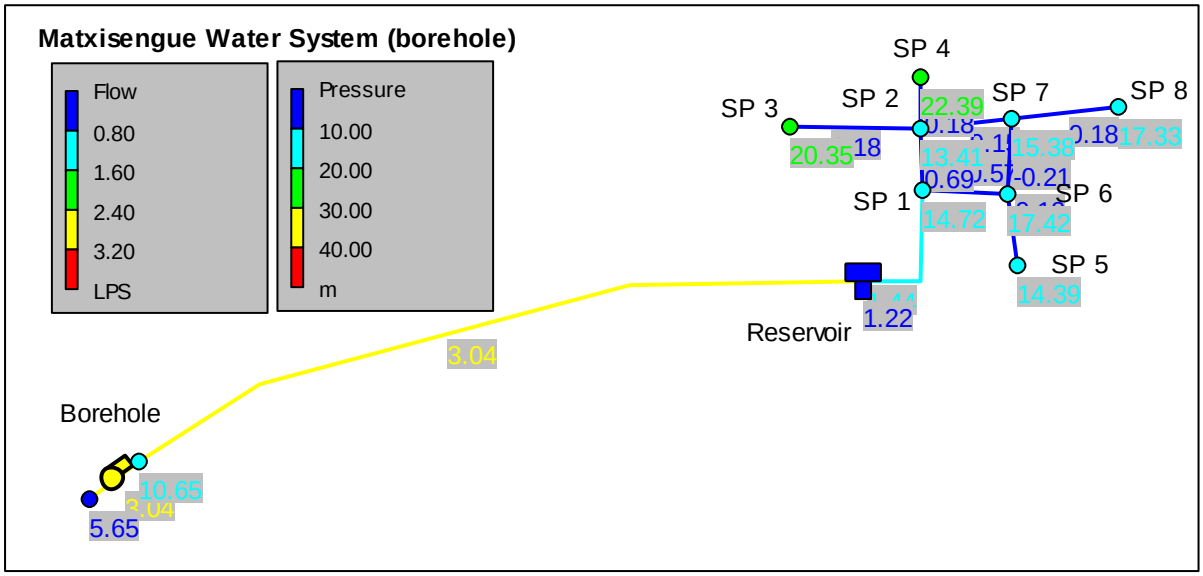



**Figure 29: Flow and node pressure for Option 2 (electromechanical pump) - Matxisengue**




## 9.6 Costs

The investment and O&M costs for each of the design options are included in Table 17. The costs are based on the design population and the unit costs calculated for the specific type of system. **A description of how the unit costs were developed is included in the NRWSSP Phase 2 Report.** The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 17: Investment and O&M costs - Matxisengue**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Borehole / solar pump / piped dist. | 1 | 1,981 | 153.65 | 304,400 | 5.11 | 10,100 |
| 2) Borehole / electromech. pump / piped dist. | 1 | 1,981 | 150.15 | 297,400 | 7.90 | 15,600 |

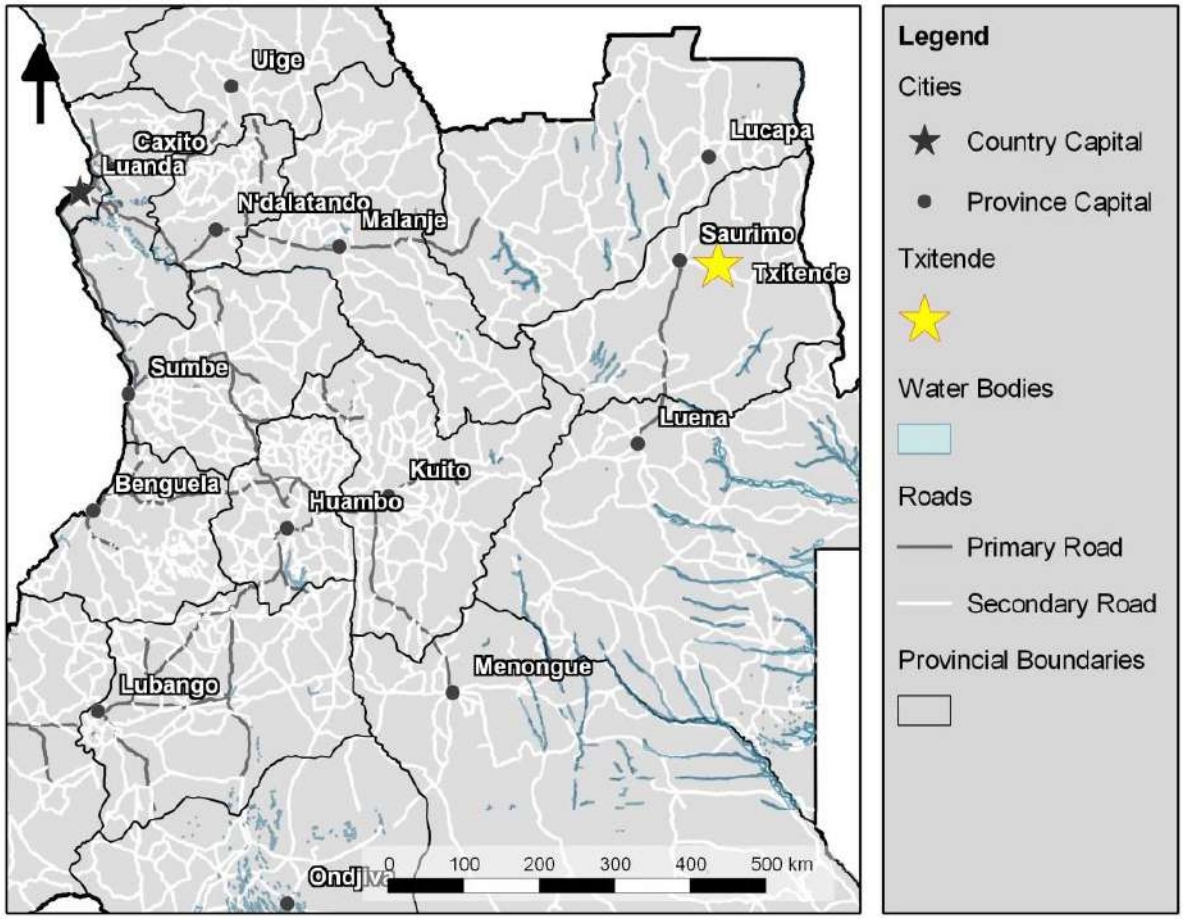
# 10 CONCEPTUAL DESIGN FOR TXITENDE, LUNDA SUL PROVINCE

## 10.1 Community description

Txitende is a village in the commune of Muriege, municipality of Muconda, province of Lunda Sul. The community is located at coordinates -9.707599, 20.843697 (latitude, longitude), or about 50 km east of Saurimo. Refer to map – Figure 30.

The population was estimated at 380 people during the field visits. The community is set up on both sides of a main road in an orderly manner, and a school and a church have also been identified. Moreover, interviews indicate that the community has come to settle in the area after a feud 25 years ago in the village of origin, located 3 km to the west.

**Figure 30: Location of Txitende Village in the Province of Lunda Sul, Angola**




The region has a mix of dense vegetation and evergreen, with many small streams, springs, etc. that could potentially be used for water supply. A river located 2.5 km west of the community is used by a small portion of the community, whereas a large spring located about 1 km east of the community is also used as an unimproved water source. Wells and boreholes have been dug in the past by NGOs, under government funding, or through the inhabitants' own initiative. Refer to the elevation basemap (Figure 31) for locations of community infrastructure and photos in Figure 32.

Estimates place the percentage of households with a latrine at over 90%, with a small portion of the population practicing open defecation. Cases of diarrheal disease occur in the community.

**Figure 31: Txitende Community on Elevation Contour Basemap[6]**

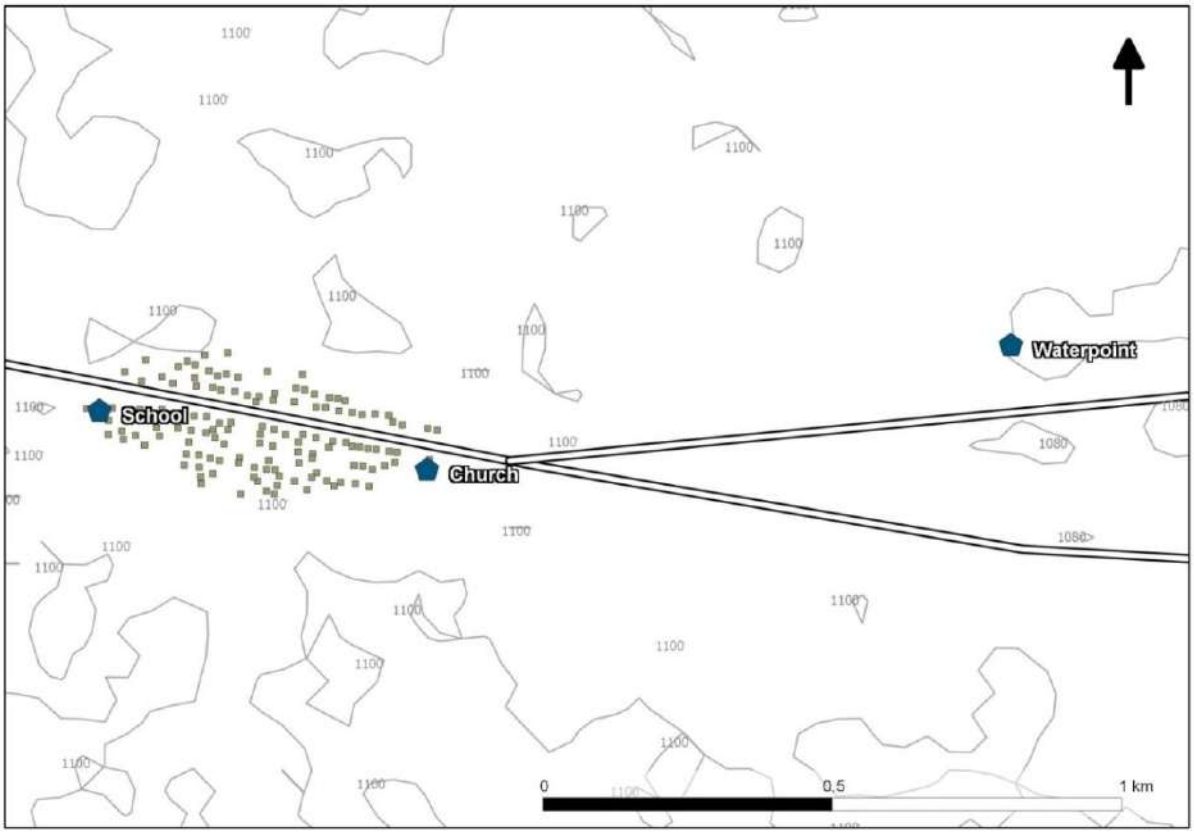



**Figure 32: Photo of Houses in the Community (left) and the School (right) in Txitende**

[6] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

## 10.2 Population

### 10.2.1 Demographics

The field study conducted in the village visited 20 of a total of 63 households, which corresponds to a sampling rate of 31.7%. The average household size is 4.9, with an average of 2.3 children under the age of 15, 1.4 females over the age of 15 and 1.2 males over the age of 15.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity with 55% (11 out of 20) and followed by informal business with 45% (9 out of 20).

### 10.2.2 Population estimate

A house counting from satellite photos indicated 70 households in Txitende. This is in line with the population estimate of 380 that was done in the field. Refer to Table 18.

**Table 18: House Counting Summary (Txitende)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Txitende | 70 | 6 | 420 |

## 10.3 Existing water supply & sanitation situation

### 10.3.1 Water supply

**Current situation**

There is currently no functioning water supply infrastructure in the Txitende area, but there have been various interventions in the community in the past.

The community was recently incentivised by an NGO called “Luterana” to dig a well, however no supervision or guidance is being provided. The community dug approximately 6 meters so far without reaching the water table, but at an angle of 80º which will make it extremely difficult for the well to be used once the water table is reached. Refer to photos in Figure 33.

Two boreholes were also constructed in different periods by an NGO and by the government, but these are currently non-functional due to a lack of maintenance and problems related to sandy soils.

Finally, a Chinese contractor has recently drilled new boreholes and built two standpipes. However, the boreholes are sealed and the contractor never finished the works, leaving most of the materials on site. It is assumed that this system was going to be powered by a solar pump.

**Figure 33: Well Incentivized by the NGO "Luterana" in Txitende**

The population is currently using shallow wells and a large spring for their water needs. The community hand dug three shallow wells about 60 cm in diameter and 80 cm deep (refer to Figure 34), where the water can be found at 30 cm deep. The water appears to be of good quality; however the yields are not sufficient for the whole population. These shallow wells are located in close proximity to the spring which has been identified on the community map.

**Figure 34: One of three shallow wells, Txitende**

Overall, findings suggest that 55% (11 out of 20) of the population consumes unfit water mostly from the river, 30% (6 out of 20) from the spring and lastly, 15% (3 out of 20) from the small hand dug wells. Responses regarding the treatment of water in the home revealed that 95% (19 out of 20) do not use any form of treatment, while the remaining 5% (1 out of 33) treat their water in some way before drinking.

## Water sources

There are two main unimproved water points in the surrounding area of the Txitende community:

- *River:* A river located approximately 2.5 km west of the community is used by Txitende inhabitants. However the water quality can be quite low, depending on the season.
- Spring: A large spring is located approximately 1 km east of the community. It is covered by a thick layer of organic matter (bog-like) before spreading about 100 m wide and becoming the tributary of one of the many rivers flowing north towards Lunda Norte and the Democratic Republic of the Congo (DRC).

### 10.3.2 Sanitation

In many rural communities such as Txitende sanitation remains a huge impediment to health of the inhabitants, mainly because: 1) few homes have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing.

However, Txitende inhabitants have recently participated in a wide sanitation and hygiene programme implemented by the international NGO “Luterana” which resulted in a significant improvement in household latrine coverage. The school also has segregated latrines for girls and boys.

Households consulted during the field visits tended to claim that open defecation does not occur: survey results indicate that 10% (2 out of 20) of homes practice open defecation while the remaining 90% (18 out of 20) use a family latrine.

### 10.3.3 Gender and walking distance

Water collection is generally a burden for women and girls who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 40% (8 out of 20) of households surveyed, while in the remaining 45% (9 out of 20) of households fetching water was stated to be a girls’ responsibility. The remaining 15% (3 out of 20) indicate that it can be done by all household members. These results validate the fact that fetching water is a female responsibility according to local customs.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that households spend more than an hour per day fetching water, as they have to walk over 2.5 km twice per day.

### 10.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 0.20 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would not be willing to pay more for improved water supply. This will need to be followed up with a more in-depth analysis at the feasibility stage. It is estimated that households spend an average of USD 197.38 per month excluding expenditures on water.

Focus groups agreed that the community would be willing to pay at least USD 0.20 per $m^3$ for improved water service. However, many still have the perception that water is a right and it should not be priced.

## 10.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in Section 4 – Design guidelines. The design parameters for Txitende are presented below in Table 19.

**Table 19: Water demand calculation, Txitende**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Population** | | |
| Current population | persons | 380 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 502 |
| **Daily consumption** | | |
| Population served | persons | 502 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | $m^3$/day | 15.05 |
| **Physical losses** | | |
| Physical losses | % of daily demand | 10 |
| Physical losses | m3/day | 1.51 |
| **Water demand** | | |
| Total average daily demand | $m^3$/day | 16.56 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |
| Daily Peak Demand | $m^3$/day | 21.53 |
| Hourly Peak Demand | $m^3$/day | 33.12 |
| Hourly Peak Demand | L/s | 0.38 |
| **Number of standpipes** | | |
| Number of persons per standpipe | persons | 250 |
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 2.01 |
| Number of standpipes (rounded) | - | 3 |
| Design flow per standpipe | L/s | 0.13 |
| **Design flow at outlets** | | |
| Design flow with hourly peak factor | L/s | 0.13 |
| Design flow without hourly peak factor | L/s | 0.06 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.13 L/s, and the daily average flow is 0.06 L/s. These values would be used in the Epanet hydraulic simulations if a piped distribution system was to be considered as a feasible option.

## 10.5 System design

### 10.5.1 Review of technical options

Given the various water sources investigated during the field mission, various options exist for the future improvement of water supply in Txitende:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements. Special considerations would be needed for borehole siting and location because of the sandy soil conditions observed.
- *Gravity distribution:* Most households are slightly higher in elevation than the two sources identified; therefore a gravity-fed piped system is not technically feasible.
- *Ram pump with gravity distribution:* Technically feasible. Water from the source can be pumped using a ram pump to a delivery tank from which water is distributed by gravity.

The source would be either the river located east of the community, or the large spring located west.

- *Borehole with an electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, and subject availability of electricity.
- *Solar pump with gravity distribution:* Technically feasible if groundwater quality is good. Options for the source include a newly drilled high-yield borehole, the river located east of the community, or the large spring located to the west.
- *Surface water with pump, treatment and piped distribution*: Although there is a river in the area, other alternatives are more appropriate for this community, particularly due to the small population and high cost of a treatment system.

From this preliminary analysis and also given the small population of the Txitende community, boreholes with hand pumps are selected as the most feasible option.

- Option 1 – Boreholes and hand pumps: The first option for the community would be to drill approximately two positive boreholes, which would be strategically located to cover the geographical extent of the community. The boreholes would be fitted with hand pumps. The use of hand pumps will be conditional on a water quality check and pumping test results.

### 10.5.2 Option 1 – Boreholes with hand pumps

**Design criteria**

The following design considerations were used to determine the approximate number and location of water points required to meet demand in the targeted community. Design parameters and assumptions presented in this chapter follow DNAAS standards. The following are the key design parameters used:

- Average water demand in the community (see Section 4); and
- Average distance to water point.

Based on this, two boreholes with hand pumps are required.

**Technology description**

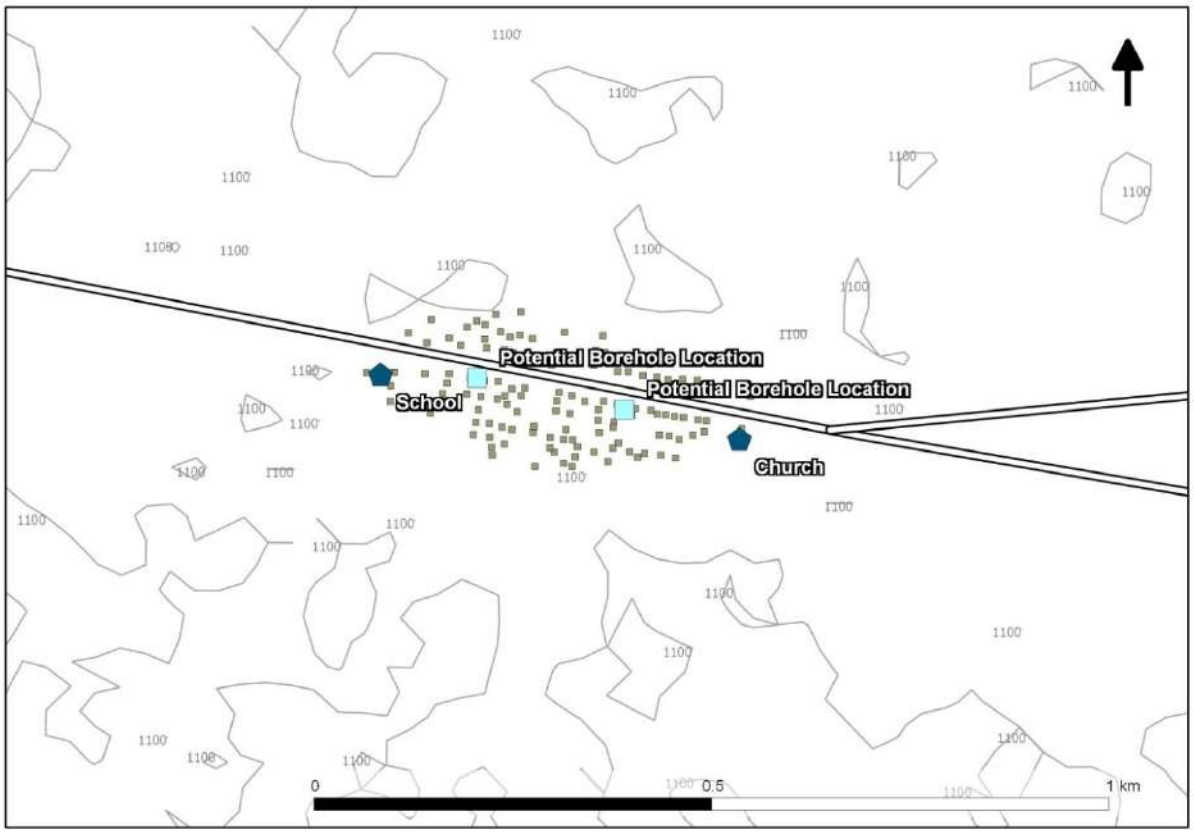
Section 3 of this report describes borehole and hand pump water systems in general, including:

- Borehole design and construction;
- Provision and installation of hand pumps;
- Related civil works such as aprons, drainage, washbasins, etc.; and
- Borehole siting.

**Water point siting**

Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. For this technology option, the approximate location of boreholes fitted with hand pumps is provided in Figure 35. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

**Figure 35: Proposed system layout (Txitende)**




## 10.6 Costs

The investment and O&M costs for each of the design options are included in Table 20. The costs are based on the design population and the unit costs calculated for the specific type of system. A description of how the unit costs were developed is included in the NRWSSP Phase 2 Report. The following are included in the unit costs:

CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and

- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 20: Investment and O&M costs – Txitende, Lunda Sul**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Borehole / Handpump | 2 | 502 | 68.45 | 68,700 | 1.78 | 1,800 |

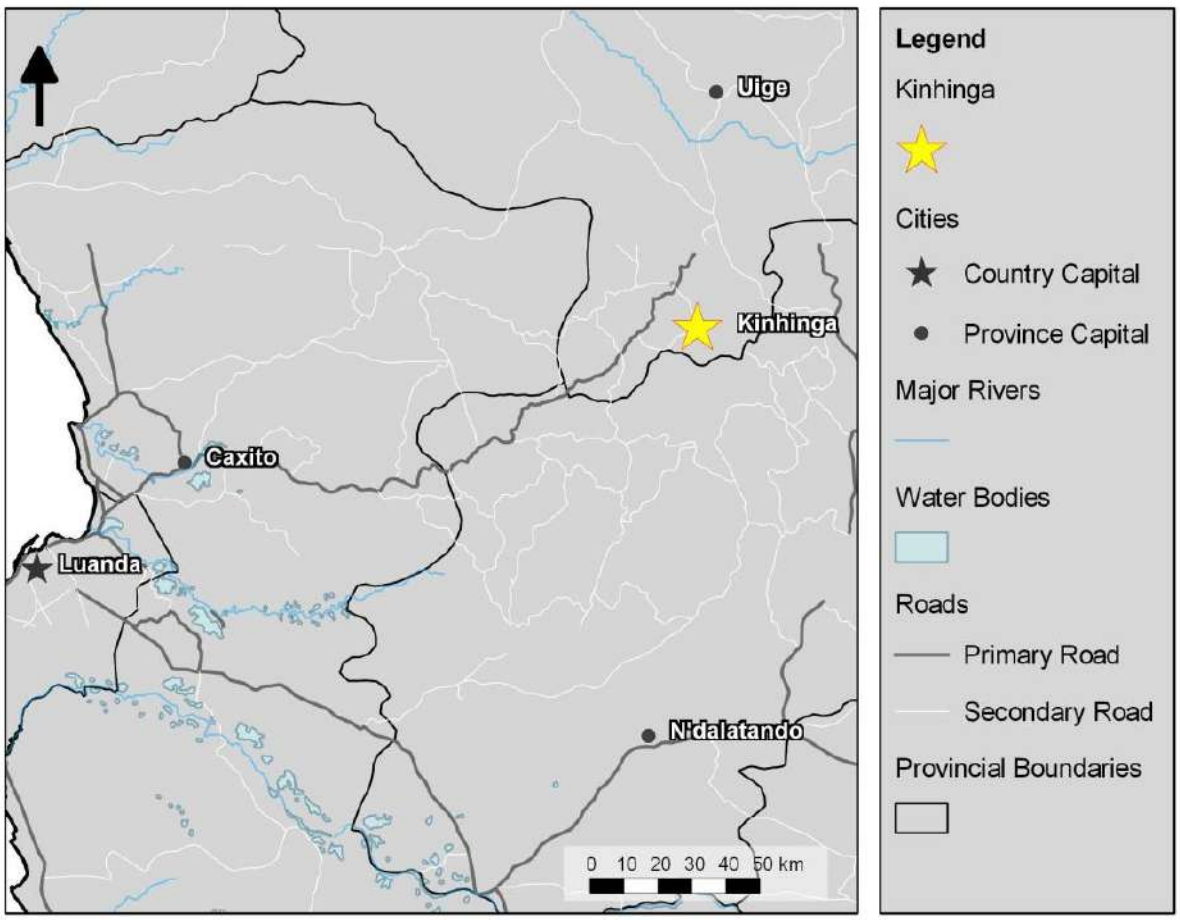
# 11 CONCEPTUAL DESIGN FOR KINHINGA, UIGE PROVINCE

## 11.1 Community description

Kinhinga is a village/aldeia in the commune of Quitexe, municipality of Quitexe, province of Uige (codes; Uige 0321, Quitexe 032101, Sede 032101). The community is located at coordinates -8.218635, 15.005902 (latitude, longitude). Refer to map in Figure 36.

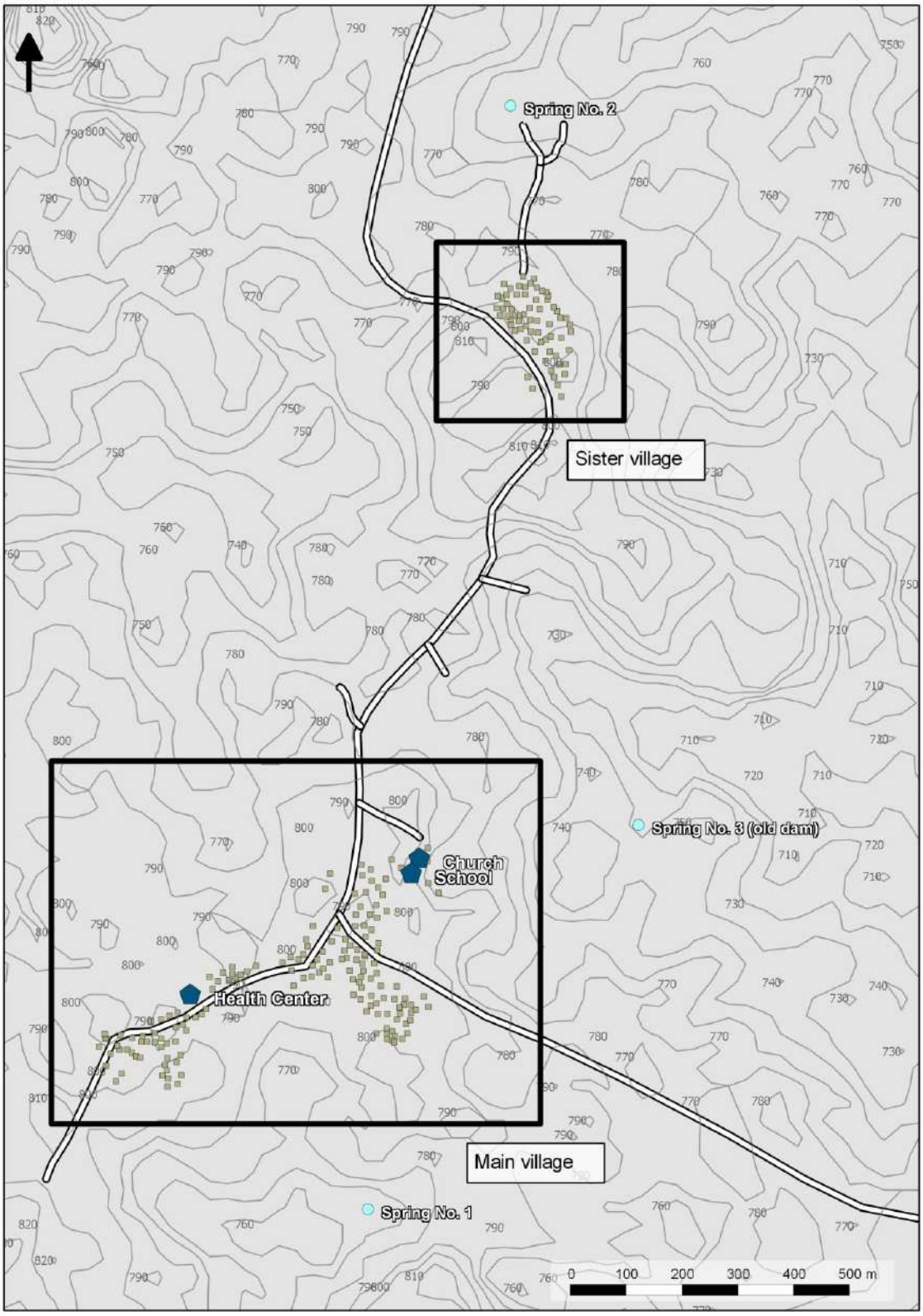
The field visit provides an estimated population of 1,500 people for the main community and 250 people for a sister village that could be included in the water system as well. There is a school/community hall, a church and a health center that have been identified during the visit in the main community. The sister village is approximately 1 km north from the main village and linked by a small dirt road that goes across the area from north to south. Figure 37 shows a map of the community infrastructure for both villages on an elevation contour basemap, while Figure 38 shows some photos of the villages.

**Figure 36: Location of the Kinhinga Village in the Province of Uige, Angola**




The region has a mix of dense vegetation and clear land, with many small streams, springs, etc. that could be used for water supply. Groundwater could also be considered for boreholes and hand pumps. Three springs that could be used for a water system were identified in the area and will be described in this report.

**Figure 37: Kinhinga main community (bottom) & sister community (top right) on elevation contour Basemap[7]**




[7] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

The population is currently using several unimproved water sources (three springs) and a surface stream for their water needs. Estimates place the percentage of households with a latrine at about 20%, with a large portion of the population practicing open defecation. Cases of diarrheal disease occur in the community.

**Figure 38: Community meeting point and houses in Kinhinga**

## 11.2 Population

### 11.2.1 Demographics

The field study conducted in the village visited 33 of a total of 293 households, which corresponds to a sampling rate of 11.6%. The average household size is 6.4, with an average of 1.7 children under the age of 15, 2.2 females over the age of 15 and 1.8 males over the age of 15.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity with 82% (27 out of 33), followed by informal business with 12% (4 out of 33) and the remaining 6% (2 out of 33) is employed by the local government as public servants such as teachers and nurses.

### 11.2.2 Population estimate

A house counting from satellite photos indicates 200 households in the main village and 90 households in the sister village. Globally, this is in line with the population estimates of 1,500 and 250 that were done in the field. Refer to Table 21.

**Table 21: House Counting Summary (Kinhinga)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Kinhinga | 200 | 6 | 1,200 |
| Sister village | 90 | 6 | 540 |
| Total | 290 | - | 1,740 |

## 11.3 Existing water supply & sanitation situation

### 11.3.1 Water supply

**Current situation**

There is currently no existing water supply infrastructure in the area surrounding the Kinhinga villages. Three springs that could be used for a water system were identified in the area are described in this report. According to its location, general water quality and quantity, and consultation with the community, one spring was identified to supply the system in case the option chosen involves a spring catchment.

The population is currently using those unimproved water sources (three springs) and a surface stream for their water needs. Discussions with health personnel indicate that diarrheal cases and malaria are prevalent. This problem is exacerbated during the rainy season when water quality at these sources deteriorates due to surface runoff, thereby increasing the incidence of these health problems. It was also reported that during the dry season some of these sources tend to dry up, leading to problems of water scarcity. Finally, it appears that animals at times share these same water sources, which represents a serious risk for human consumption.

Overall, findings suggest that 100% (33 out of 33) of the population consumes unfit water mostly from unprotected rivers/streams, and small hand dug catchments. 91% (30 out of 33) claim to fetch water directly from a spring or small stream, while the remaining 9% (3 out of 33) collect water from small hand dug catchments and rivers. Responses regarding the treatment of water in the home revealed that 91% (30 out of 33) do not use any form of treatment, while the remaining 9% (3 out of 33) treat their water in some way before drinking.

**Water sources**

There are three unimproved water points in the surroundings of the Kinhinga community.

**Figure 39: Spring No. 1 (Kinhinga)**

*Spring 1:* The community mainly uses this spring (refer to Figure 39) as a water source for drinking water and washing water because of its proximity, located about 350 m south from the main village. Estimates indicate that the flow is too low to supply the population with a reasonable volume of water per capita, even during the rainy season.

*Spring 2:* Spring 2 (Refer to Figure 40), located approximately 300 m north of the sister village, is mainly used by the sister village, and sporadically used by inhabitants of the main village. The source is composed of five springs feeding a small stream flowing towards the north. The flow for each spring was estimated at 10 L/min, or 0.17 L/s, for a total flow of 0.83 L/s. This could potentially meet the demand from the community depending on the level of service provided. If this doesn't prove to be sufficient after a detailed flow measurement survey, the system could be supplemented by additional sources or borehole(s).

**Figure 40: Spring site No. 2 (Kinhinga)**

*Spring 3:* Spring 3 comprises a small dam believed to date from the 1970s, located about 500 m east of the main village (refer to Figure 41). Originally, this dam fed a small water supply system powered by a ram pump which no longer exists. Water quality is poor due to refuse left by the population, and because of open defecation practiced upstream in the village area. According to the community, this water source is only used for washing, not drinking. This spring will not be considered for the system because of the quality issues. Furthermore, the community perceives this source as dirty and would not accept to drink it even if it was treated.

**Figure 41: Spring site No. 3 (Kinhinga)**

### 11.3.2 Sanitation

In many rural areas such as the community of Kinhinga sanitation remains a huge impediment to health of the inhabitants mainly because: 1) few homes have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing in the area.

Households consulted during the field visits tended to claim that open defecation does not occur, however survey results indicate that 79% (26 out of 33) of homes practice open defecation while the remaining 21% (7 out of 33) use family latrines. This situation, coupled with the quality of water at three springs in use explains the prevalence of diarrheal cases in the community.

### 11.3.3 Gender and walking distance

Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the

respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 58% (19 out of 33) of households surveyed, while in the remaining 42% (14 out of 33) of households fetching water was stated to be a girls' responsibility. These results validate the fact that fetching water is a female responsibility according to local customs and practices.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that women spend an average of about an hour per day fetching water, as they have to walk over 500 m twice per day.

### 11.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 0.36 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would not be willing to pay more for improved water supply. This will need to be followed up with a more in-depth analysis at the feasibility stage. It is estimated that households spend an average of USD 128.00 per month excluding expenditure on water.

Focus groups suggest agreed that the community would be willing to pay at least USD 0.36 per $m^3$ for improved water service. However, many still have the perception that water is a right and it should not be priced.

## 11.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in Section 4 – Design guidelines. The design parameters for Kinhinga are presented below in Table 22.

**Table 22: Water demand calculation, Kinhinga**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Population** | | |
| Current population | persons | 1800 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 2377 |
| **Daily consumption** | | |
| Population served | persons | 2377 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | $m^3$/day | 71.31 |
| **Physical losses** | | |
| Physical losses | % of daily demand | 10 |
| Physical losses | $m^3$/day | 7.13 |
| **Water demand** | | |
| Total average daily demand | $m^3$/day | 78.44 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| Daily Peak Demand | $m^3$/day | 101.97 |
| Hourly Peak Demand | $m^3$/day | 156.88 |
| Hourly Peak Demand | L/s | 1.82 |
| **Number of standpipes** | | |
| Number of persons per standpipe | persons | 250 |
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 9.5 |
| Number of standpipes (rounded) | - | 10 |
| Design flow per standpipe | L/s | 0.18 |
| **Design flow at outlets** | | |
| Design flow with hourly peak factor | L/s | 0.18 |
| Design flow without hourly peak factor | L/s | 0.09 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.18 L/s, and the daily average flow is 0.09 L/s. These values will be used in the Epanet hydraulic simulations.

## 11.5 System design

### 11.5.1 Review of technical options

Given the various sources investigated during the field mission, Spring 2 - located just north of the sister village at an approximate elevation of 754 m above sea level - was selected as the most viable source for supplying a piped system. Various options then exist for the future improvement of water supply in Kinhinga:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements. This would likely be the cheapest and most simple option.
- *Gravity distribution:* Most households are slightly higher in elevation than Spring 2, therefore a gravity-fed piped system is not technically feasible.
- *Ram pump with gravity distribution:* Water from the spring can be pumped using a ram pump to a delivery tank from which water is distributed by gravity, so this is technically feasible.
- *Borehole with an electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, and subject to availability of electricity.
- *Solar pump with gravity distribution:* Technically feasible if source used is either a spring or a borehole (with groundwater quality meeting given requirements).
- *Surface water with pump, treatment and piped distribution*: Although there are streams in the area, other alternatives are more appropriate for this community.

From this preliminary analysis, and in order to include a broad range of potential technical options as part of the sample project designs, boreholes with hand pumps is selected as the first option, followed by a ram pump piped system as the second option.

- Option 1 – Boreholes and hand pumps: The first option for the community would be to drill approximately ten positive boreholes: eight in the main community and two in the sister village. The boreholes would be fitted with hand pumps. The use of hand pumps will be conditional on a water quality check and pumping test results. Concerns have already been raised about potential groundwater contamination because of open defecation practices in the community.

- Option 2 – Ram pump with distribution network: The second option involves the capping of a spring, pumping using a hydraulic ram and gravity distribution. This scenario is conditional to further checks on the spring yield available. The general system layout and proposed pipeline route is shown in Figure 42. This layout was used in Epanet to produce a hydraulic model of the system.

### 11.5.2 Option 1 – Boreholes with hand pumps

**Design criteria**

The following design considerations were used to determine the approximate number and location of water points required to meet demand in the targeted community. Design parameters and assumptions presented in this chapter follow DNAAS standards. The following are the key design parameters used:

- Average water demand in the community (see Section 4); and
- Average distance to water point.

Based on this, ten boreholes with hand pumps are required to meet the needs of the community.

**Technology description**

Section 3 of this report describes borehole and hand pump water systems in general, including:

- Borehole design and construction;
- Provision and installation of hand pumps;
- Related civil works such as aprons, drainage, washbasins, etc.; and
- Borehole siting.

**Water point siting**

Suggested locations for water points have been identified taking into account the community's preferences expressed during the field study as well as the average distance to the water point for the users. For this technology option, the approximate location of boreholes would match the location of water distribution points (standpipes) provided in Figure 42. Results from further field investigations will be used to determine the final location, depending on further consultations as well as local hydro-geological and soil conditions.

### 11.5.3 Option 2 – Ram pump with distribution network

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by ram pump. Specifically this option will comprise the following:

- Spring catchment box (including protection);
- Drive tank;
- Drive pipe;
- Ram pump and pump basement'.
- Transmission line;
- Reservoir siting and location; and

- Distribution network and standpipes.

## Pipe sizing

The sizing of the pipes was done at a conceptual design level using Epanet. For most pipes in the system the minimum diameter of 50 mm has been selected, with the exception of one 72 mm section of distribution line between the reservoir and tees that branch off to various distribution points. A map of the system along with preliminary hydraulic calculation results are provided in Figures 42 to 44. The following table (Table 23) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 23: Summary of pipe length, diameter and recommended material (Kinhinga)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Drive tank – ram pump | Galvanized iron | 50 | 180 |
| Ram pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 50 | 796 |
| Spring – drive tank, distribution lines | PE or PVC (min. PN 6) | 50 | 1223 |
| Distribution lines | PE or PVC (min. PN 6) | 72 | 1277 |
| TOTAL | | | 3476 |

## Reservoir sizing

The ram pump delivers water to the main reservoir 24 hours per day at a steady flow which corresponds to the total daily demand for the community. The main reservoir delivers water in the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 to 5:00.

A design volume of 40 $m^3$ was selected for the main reservoir, which corresponds to 40% of the total daily peak consumption in the community. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

**Figure 42: Proposed System Layout (Kinhinga)**

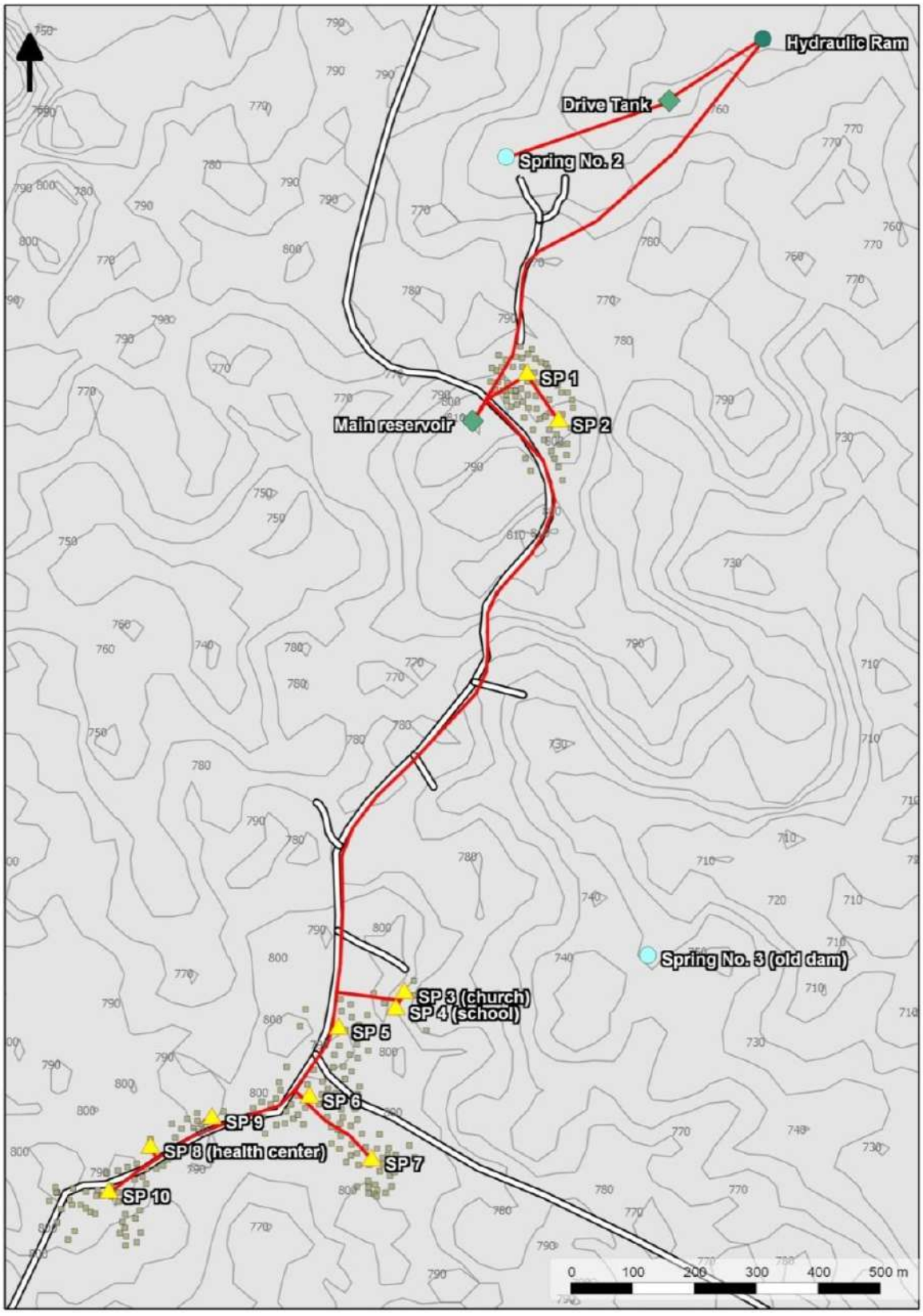


**Figure 43: Pipe Diameter and node elevation for Option 2 (ram pump) - Kinhinga**

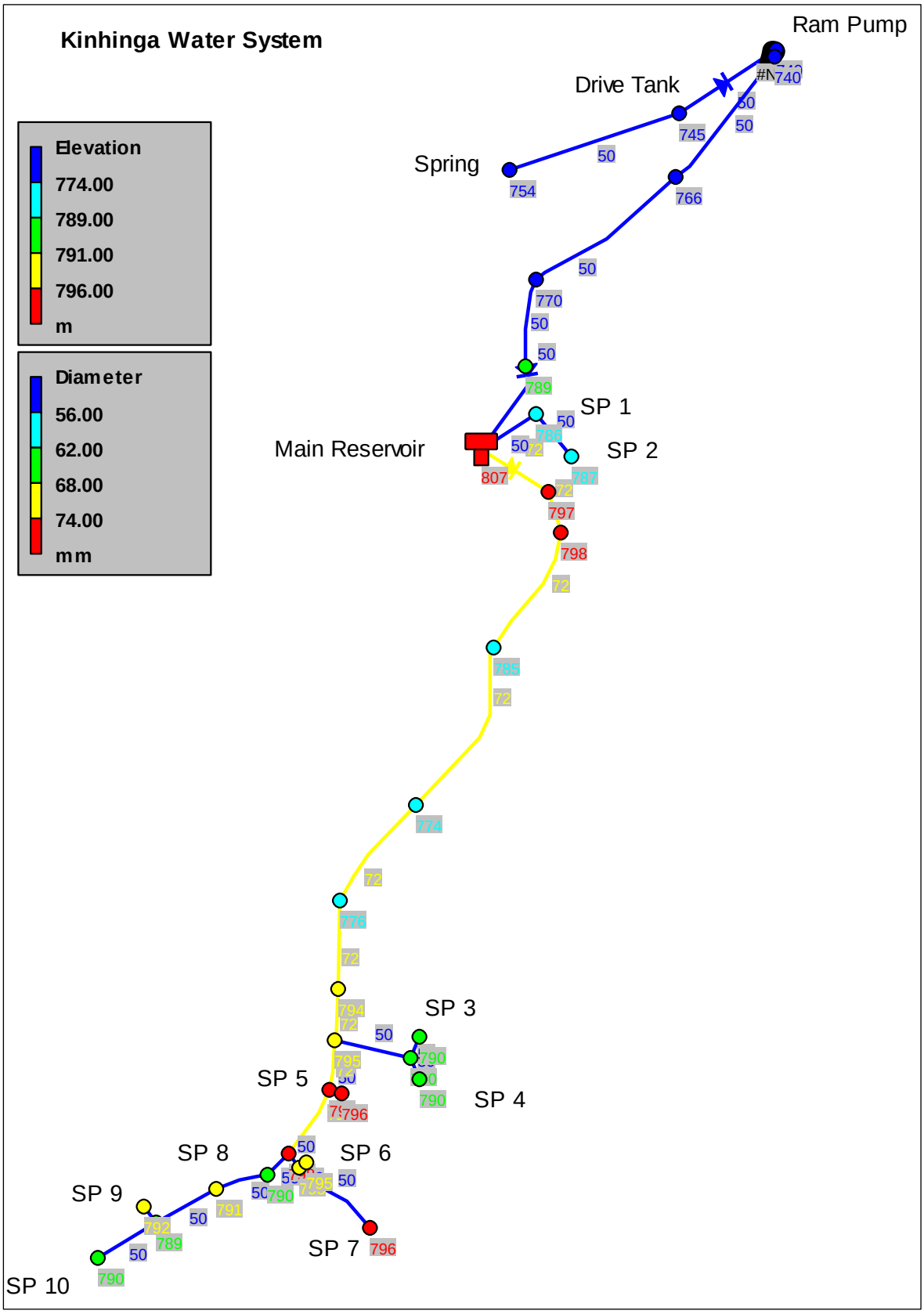
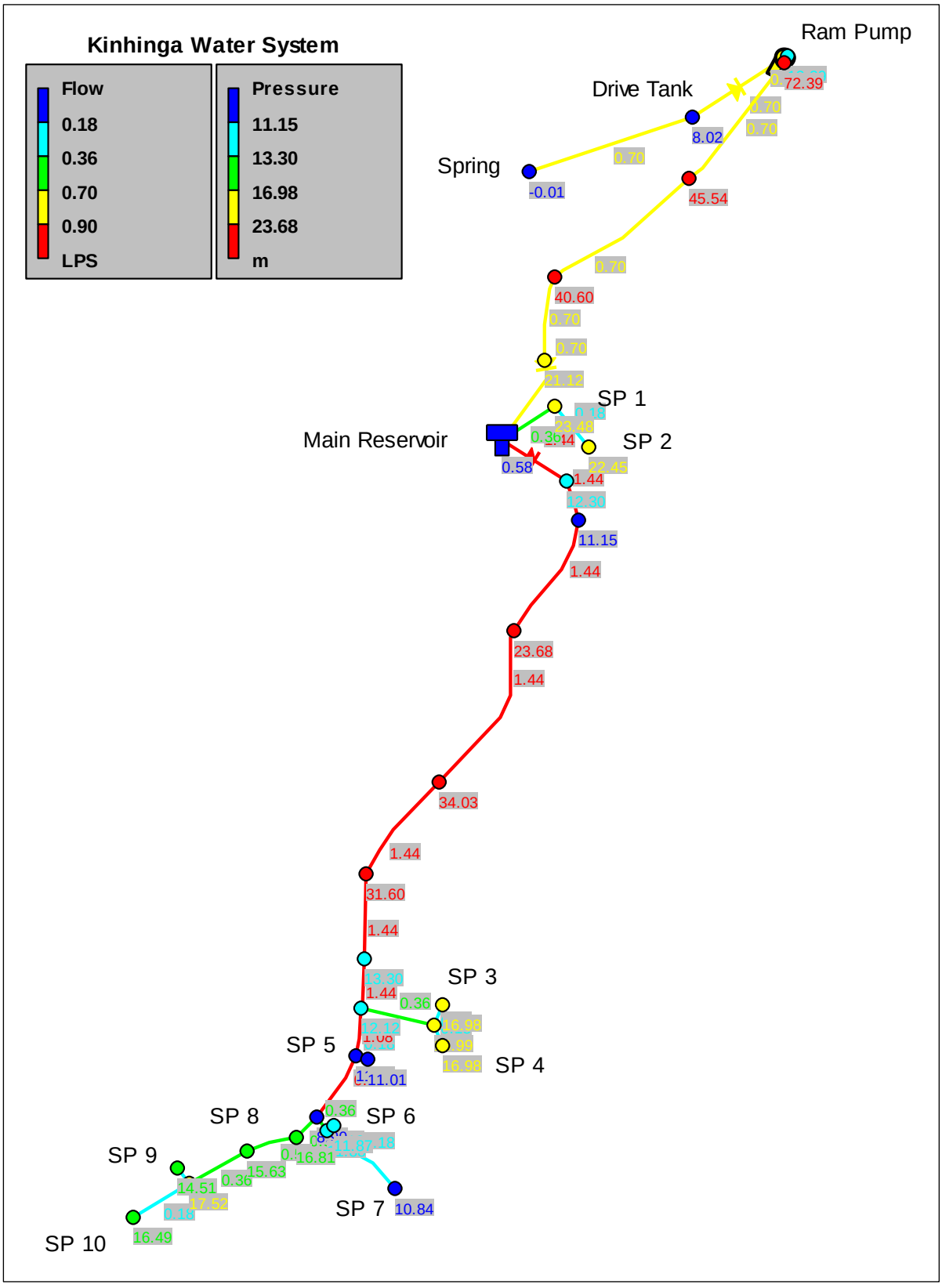


**Figure 44: Flow and node pressure for Option 2 (ram pump) - Kinhinga**



## 11.6 Costs

The investment and O&M costs for each of the design options are included in Table 24. The costs are based on the design population and the unit costs calculated for the specific type of system. **A description of how the unit costs were developed is included in the NRWSSP Phase 2 Report.** The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 24: Investment and O&M costs - Kinhinga**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Borehole / Handpump | 10 | 2,377 | 68.45 | 1,627,100 | 1.78 | 42,300 |
| 2) Spring / ram pump / piped dist. | 1 | 2,377 | 123.18 | 292,800 | 2.23 | 5,300 |

# 12 CONCEPTUAL DESIGN FOR MUFUKE, UIGE PROVINCE

## 12.1 Community description

Mufuke is a village/aldeia in the commune of Cambamba, municipality of Quitexe, province of Uige (codes unavailable). The community is located at coordinates -8.19552, 14.71365 (latitude, longitude). Refer to Figure 45 for the location of the village. The population was estimated at 1,030 people during the field visit. A school, a church, a health center and a community meeting point are located in the community, and have been identified on the community map. The village, founded in the early 1800s, sits on top of a small hill with houses spread in an irregular pattern. Moreover, the local King belonging to the sub-tribe of Dembos resides in the community. Refer to Figure 46 for the location of community infrastructure on an elevation contour basemap and Figure 47 for photos.

The region has a mix of dense vegetation and clear land, with many small streams, springs, etc. that could be used for water supply. Groundwater could also be considered for boreholes and hand pumps. Two springs that could be used for a water system were identified in the area and will be described in this report.

The population is currently using several unimproved water sources (including many seasonal springs) and a surface stream for their water needs. Estimates place the percentage of households with a latrine at about 70%, with a large part of the population practicing open defecation. Cases of diarrheal disease are occurring in the community.

**Figure 45: Location of Mufuke in the Province of Uige, Angola**

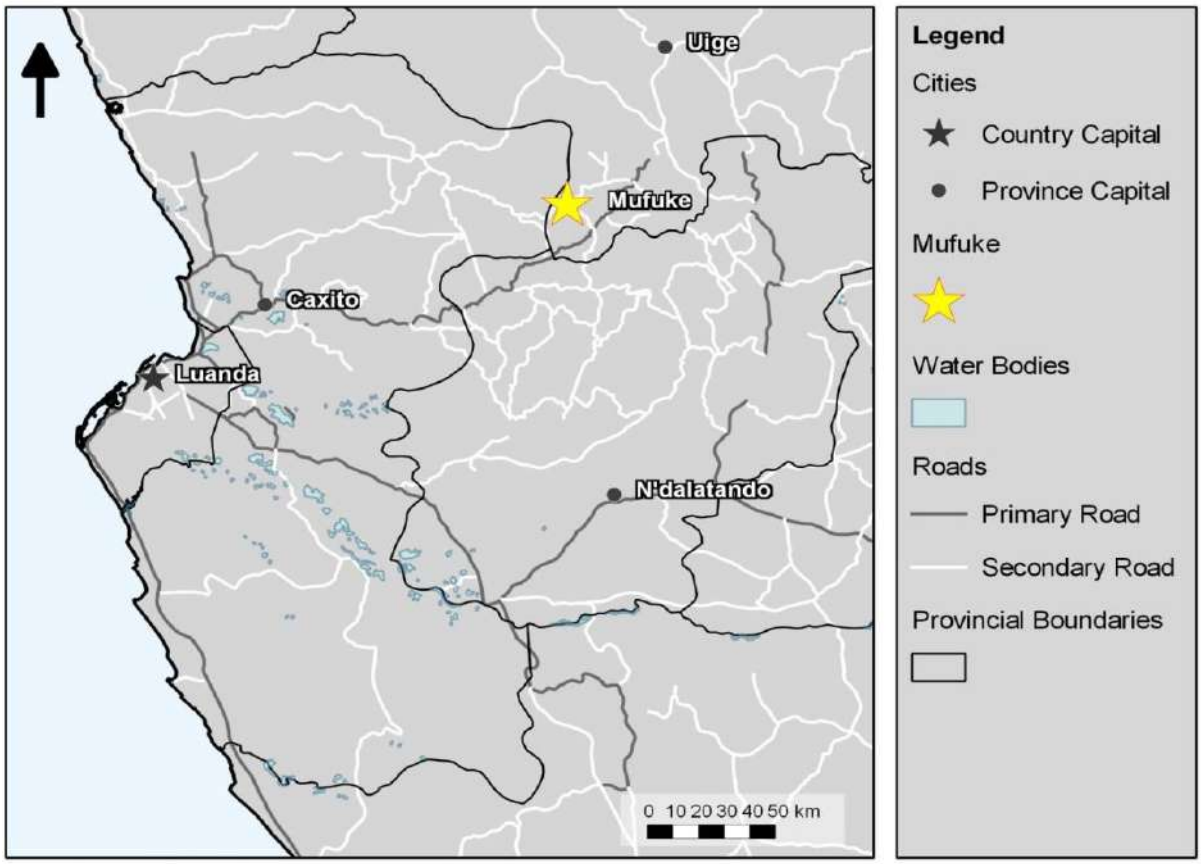


**Figure 46: Mufuke on elevation contour basemap**[8]

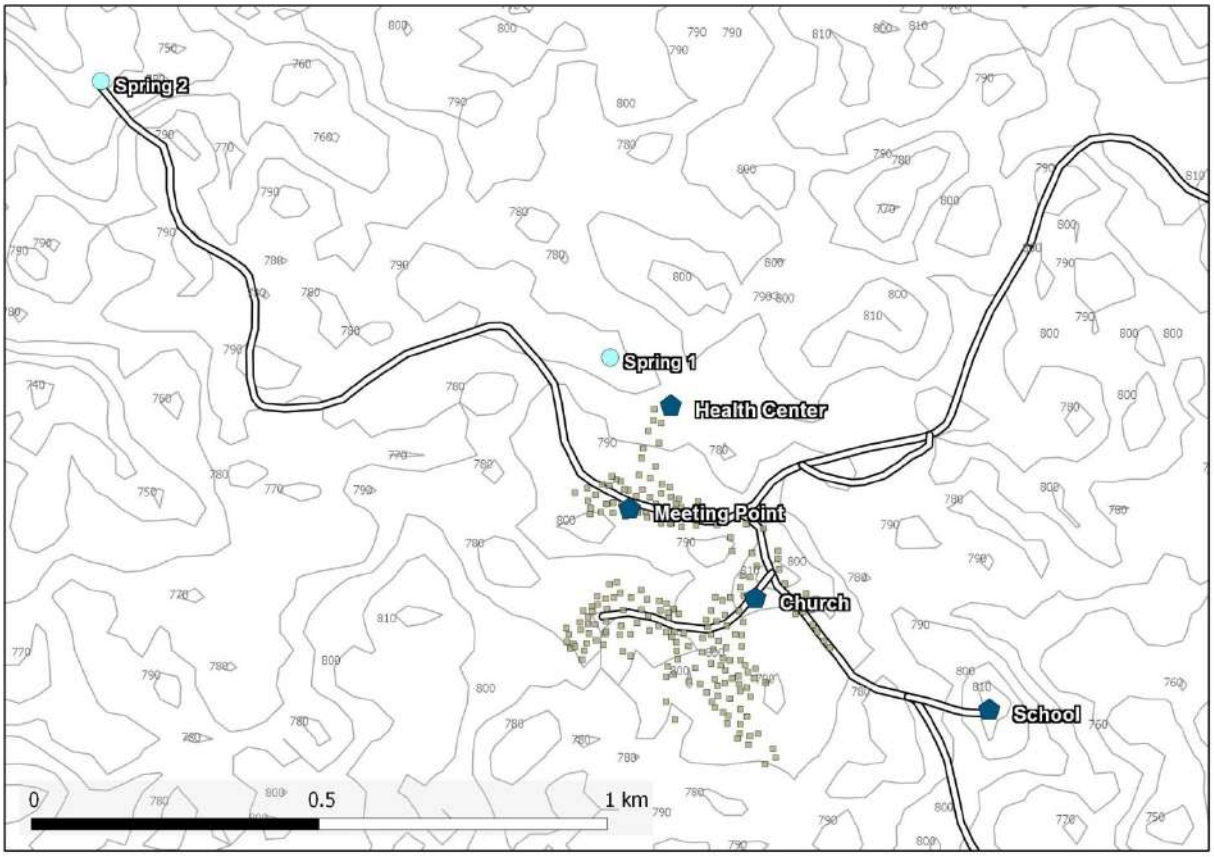



**Figure 47: Community on hilltop (left) and small gathering in Mufuke (right)**

## 12.2 Population

### 12.2.1 Demographics

The field study conducted in the village visited 29 of a total of 172 households, which corresponds to a sampling rate of 16.8%. The average household size is 5.8, with an

[8] Contour lines generated using ASTER GDEM v2 data (credits to NASA-METI, 2012)

average of 1.7 children under the age of 15, 2.0 females over the age of 15 and 2.1 males over the age of 15.

Households are mostly engaged in small-scale self-employment such as raw food vending, game meat vending, retail trade and roadside vending. Statistics indicate that agriculture is the leading activity with 72% (21 out of 29) of households, followed by informal business with 21% (6 out of 33) and the remaining 7% (2 out of 29) is employed by the local government as public servants such as teachers and nurses.

### 12.2.2 Population estimate

A house counting from satellite photos indicated 190 households in the community. This is in line with the population estimate of 1,030 that was done during field visits. Refer to Table 25.

**Table 25: House Counting Summary (Mufuke)**

| AREA | HOUSE COUNT | PEOPLE PER HOUSEHOLD | POP. ESTIMATE |
|---|---|---|---|
| Mufuke | 190 | 6 | 1,140 |

## 12.3 Existing water supply & sanitation situation

### 12.3.1 Water supply

**Current situation**

There is currently no existing water supply infrastructure in the area surrounding Mufuke. Two main springs that could be used for a water system were identified in the area are described in this report. According to its location, general water quality and quantity, and consultation with the community, one spring was identified to supply the system in case the option chosen involves a spring catchment. Additional small springs are present as well as a small river/stream, but they are located at a distance from the community and were not accessible during the field visits.

The population is currently using those unimproved water sources and a surface stream for their water needs. Discussions with health personnel indicate that diarrheal cases and malaria are prevalent. This problem is exacerbated during the rainy season when water quality at these sources deteriorates due to surface runoff, thereby increasing the incidence of these health problems. It was also reported that during the dry season some of these sources tend to dry up, leading to problems of water scarcity. Finally, it appears that animals at times share these same water sources, which represents a serious risk for human consumption.

Overall, findings suggest that 100% (29 out of 29) of the population consumes unfit water mostly from unprotected rivers/streams, and small hand dug catchments. 62% (18 out of 29) claim to fetch water directly from a spring or small stream, while the remaining 38% (11 out of 29) collect water from small hand dug catchments and rivers. Responses regarding the treatment of water in the home revealed that 79% (23 out of 29) do not use any form of treatment, while the remaining 21% (6 out of 29) treat their water in some way before drinking.

**Water sources**

As mentioned previously, there are two main potential sources in the surroundings of the Mufuke community:

- *Spring 1:* The community mainly uses this spring as a water source for drinking water and washing water because of its proximity, located about 100 m north from the village. Estimates indicate that flow is too low to supply the population with a reasonable volume of water per capita, even during the rainy season (below 5 L/min or 0.083 L/s).
- *Spring 2:* Located approximately 1000 m north-west of the village, Spring 2 is used for multiple purposes by inhabitants of Mufuke (Refer to Figure 48 for photos). The source is actually a small stream fed by multiple springs. The total flow is estimated to be well over 50 L/min or 0.83 L/s. This could potentially meet the demand from the community depending on the level of service provided. If this doesn't prove to be sufficient after a detailed flow measurement survey, the system could be supplemented by additional sources or borehole(s).

**Figure 48: Spring site No. 2 in Mufuke**

### 12.3.2 Sanitation

In many rural areas such as the community of Mufuke sanitation remains a huge impediment to health of the inhabitants mainly because: 1) many households do not have a latrine; and 2) where latrines exist these do not meet appropriate standards in terms of construction or cleanliness. In the study area the main forms of sanitation used include latrines, open defecation, toilets connected to a septic tank, latrines without slab as well as pour-flush latrines. Open defecation remains a major health threat that is most likely responsible for the large numbers of water diseases prevailing in the area.

Households consulted during the field visits tended to claim that open defecation does not occur, however survey results indicate that 31% (9 out of 29) of homes practice open defecation while the remaining 69% (20 out of 29) use a family latrine. This situation, coupled with the quality of water at three springs in use explains the prevalence of diarrheal cases in the community.

### 12.3.3 Gender and walking distance

Water collection is generally a burden for women and young females who invest a great deal of productive time in this activity. The household survey responses indicate that 100% of the respondents claim that fetching water is a female duty or responsibility. Community focus group discussions also support this; males will generally only collect water when living alone or when a female family member is sick. Mothers are generally responsible for fetching water in 72% (21 out of 29) of households surveyed, while in the remaining 28% (8 out of 29) of households fetching water was stated to be a girls' responsibility. These results validate

the fact that fetching water is a female responsibility according to local customs and practices.

The distance to the water source is closely related to the quality and quantity of water consumed by households and to the time invested in collecting water that could alternatively be used for other economic or household activities. As distance travelled to the water sources increases, the number of trips per day will generally decrease and the potential for contamination in transit increases. Survey respondents indicated that women spend an average of about an hour per day fetching water, as they have to walk over 500 m twice per day.

### 12.3.4 Household income / willingness to pay

Survey results suggest that households in the area are willing to pay USD 0.25 per $m^3$ while the current official domestic tariff is of USD 0.40 per $m^3$. This is an indication that households would not be willing to pay more for improved water supply. This will need to be followed up with a more in-depth analysis at the feasibility stage. It is estimated that households spend an average of USD 158.00 per month excluding expenditure on water.

Focus groups agree that the community would be willing to pay at least USD 0.25 per $m^3$ for improved water service. However, many still have the perception that water is a right and it should not be priced.

## 12.4 Water demand

The key assumptions and guidelines used to establish the water demand for this community are presented in Section 4 – Design guidelines. The design parameters for Mufuke are presented below in Table 26.

**Table 26: Water demand calculation, Mufuke**

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| **Population** | | |
| Current population | persons | 1140 |
| Regional growth rate | % | 1.4% |
| Design horizon | years | 20 |
| Projected population | persons | 1505 |
| **Daily consumption** | | |
| Population served | persons | 1505 |
| Specific consumption (standpipes) | L/person/day | 30 |
| Total daily demand | m3/day | 45.16 |
| **Physical losses** | | |
| Physical losses | % of daily demand | 10 |
| Physical losses | m3/day | 4.52 |
| **Water demand** | | |
| Total average daily demand | m3/day | 49.68 |
| Peak Daily Factor | - | 1.3 |
| Peak Hourly Factor | - | 2 |
| Daily Peak Demand | m3/day | 64.58 |
| Hourly Peak Demand | m3/day | 99.36 |
| Hourly Peak Demand | L/s | 1.15 |
| **Number of standpipes** | | |
| Number of persons per standpipe | persons | 250 |

| DESIGN PARAMETER | UNITS | VALUE |
|---|---|---|
| Population served per standpipes | % | 100% |
| Number of standpipes required | - | 6.0 |
| Number of standpipes (rounded) | - | 6 |
| Design flow per standpipe | L/s | 0.16 |
| **Design flow at outlets** | | |
| Design flow with hourly peak factor | L/s | 0.16 |
| Design flow without hourly peak factor | L/s | 0.08 |

From the calculations above, the hourly peak flow to use at the standpipe is 0.16 L/s, and the daily average flow is 0.08 L/s. These values will be used in the Epanet hydraulic simulations.

## 12.5 System design

### 12.5.1 Review of technical options

Given the various sources investigated during the field mission, Spring 2 - located northwest of the village at an approximate elevation of 774 m above sea level - was selected as the most viable source for supplying a piped system. Various options then exist for the future improvement of water supply in Mufuke:

- *Boreholes and hand pumps:* Considered feasible if the groundwater quality meets given requirements.
- *Gravity distribution:* Most households are slightly higher in elevation than the spring, therefore a gravity-fed piped system is not technically feasible.
- *Ram pump with gravity distribution:* Technically feasible. Water from the spring can be pumped using a ram pump to a delivery tank from which water is distributed by gravity.
- *Borehole with an electromechanical pump and gravity distribution:* Technically feasible if groundwater quality is good, subject to availability of electricity.
- *Solar pump with gravity distribution:* Technically feasible if source used is either a spring or a borehole (with groundwater quality meeting given requirements).
- *Surface water with pump, treatment and piped distribution*: Although there are streams in the area, other alternatives are more appropriate for this community.

From this preliminary analysis, and in order to include a broad range of potential technical options as part of the sample project designs, a ram pump piped system was selected as the first option, followed by a solar pump with gravity distribution system as a second option.

- Option 1 – Ram pump with gravity distribution: The first option involves the capping of a spring, pumping using a hydraulic ram and gravity distribution. This scenario is conditional to further checks on the spring yield available. The general system layout and proposed pipeline route is shown in Figure 49. This layout was used in Epanet to produce a hydraulic model of the system.
- Option 2 – Solar pump with gravity distribution: The second option involves the drilling of a positive borehole in the area and in close proximity to the village, pumping to a reservoir using a submersible pump powered by solar panels, and gravity distribution. The general system layout and proposed pipeline route is shown in Figure 49, however it could be subject to change depending on the drilling campaign results. This layout was used in Epanet to produce a hydraulic model of the system.

### 12.5.2 Option 1 – Ram pump with gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by a ram pump. Specifically this option will comprise the following:

- Spring catchment box (including protection);
- Drive tank;
- Drive pipe;
- Ram pump and pump basement;
- Transmission line;
- Reservoir siting and location; and
- Distribution network and standpipes.

**Pipe sizing**

The sizing of the pipes was done at a conceptual design level using Epanet. For most pipes in the system the minimum diameter of 50 mm has been selected, with the exception of one 72 mm section of distribution line between the reservoir and tees that branch off to various distribution points. A map of the system along with preliminary hydraulic calculation results are provided in Figures 49 to 51. The following table (Table 27) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 27: Summary of pipe length, diameter and recommended material (Mufuke)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Drive tank – ram pump | Galvanized iron | 50 | 159 |
| Ram pump - reservoir | Galvanized iron or HDPE (min. PN 10) | 50 | 702 |
| Spring – drive tank, distribution lines | PE or PVC (min. PN 6) | 50 | 944 |
| Distribution lines | PE or PVC (min. PN 6) | 72 | 1348 |
| TOTAL | | | 3153 |

**Reservoir sizing**

The ram pump delivers water to the main reservoir 24 hours per day at a steady flow which corresponds to the total daily demand for the community. The main reservoir delivers water in the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 to 5:00.

A design volume of 26 $m^3$ was selected for the main reservoir, which corresponds to 40% of the total daily peak consumption in the community. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

**Figure 49: Proposed System Layout for Options 1 and 2 (Mufuke)**

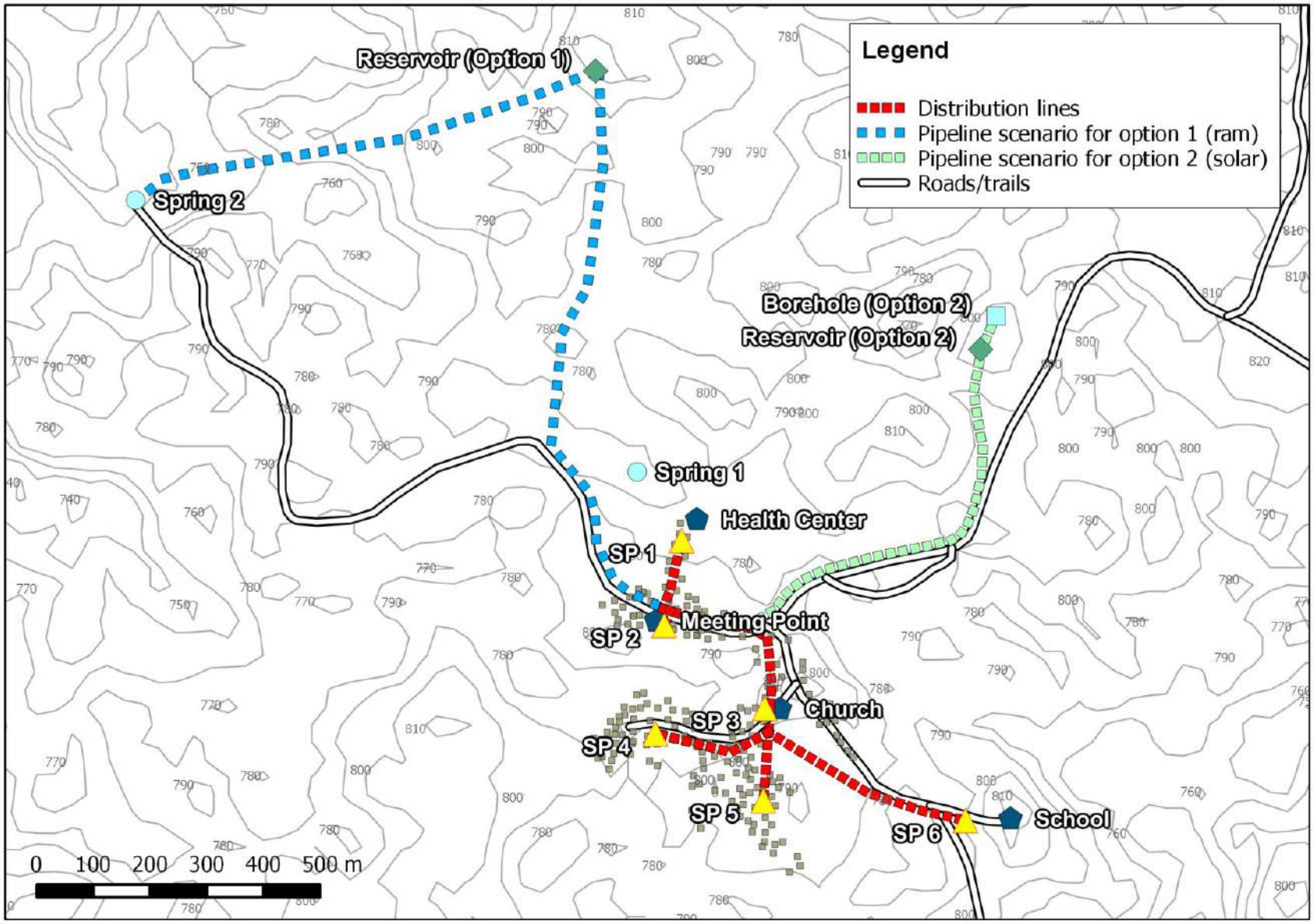


**Figure 50: Pipe Diameter and Node Elevation for Option 1 (ram pump) - Mufuke**

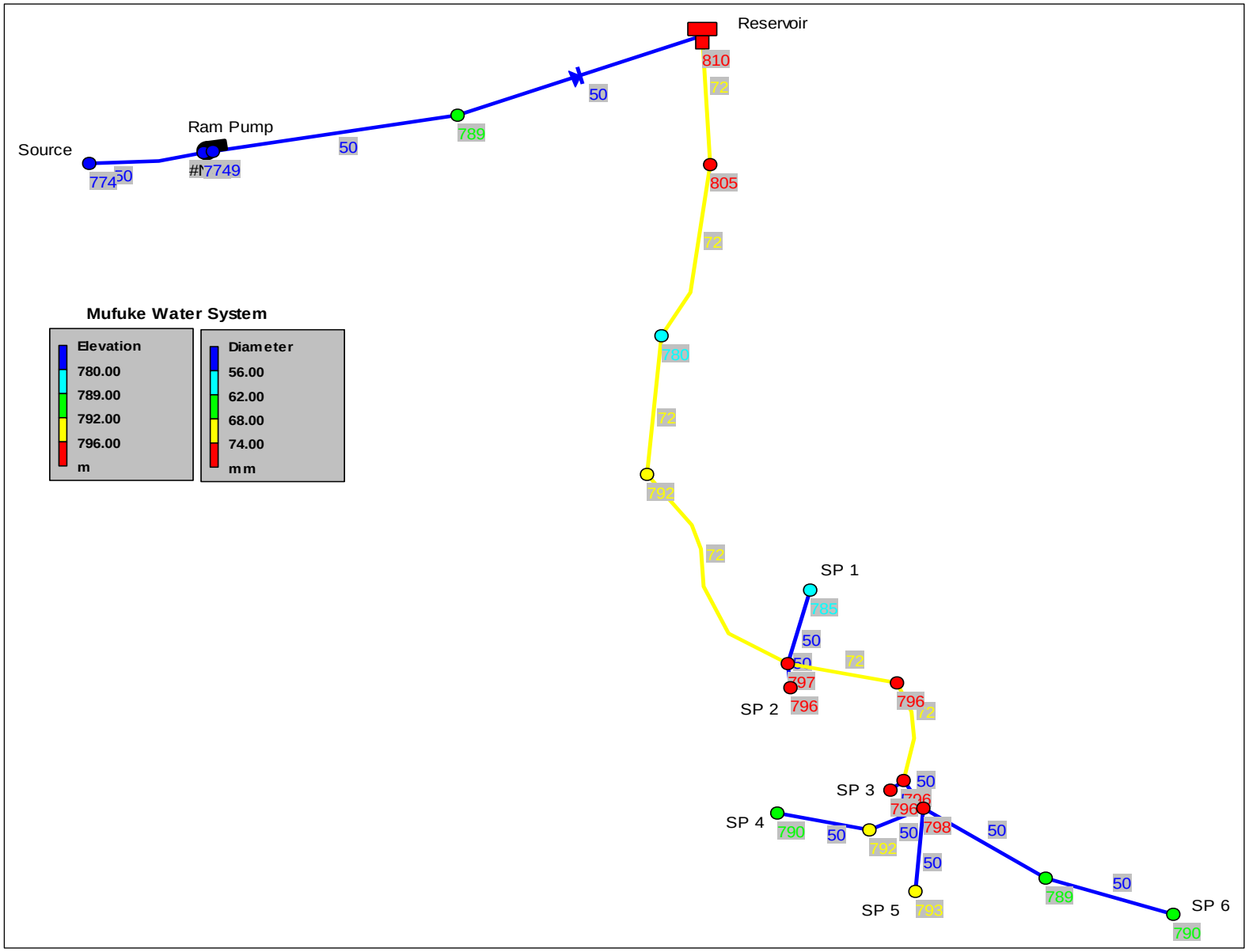
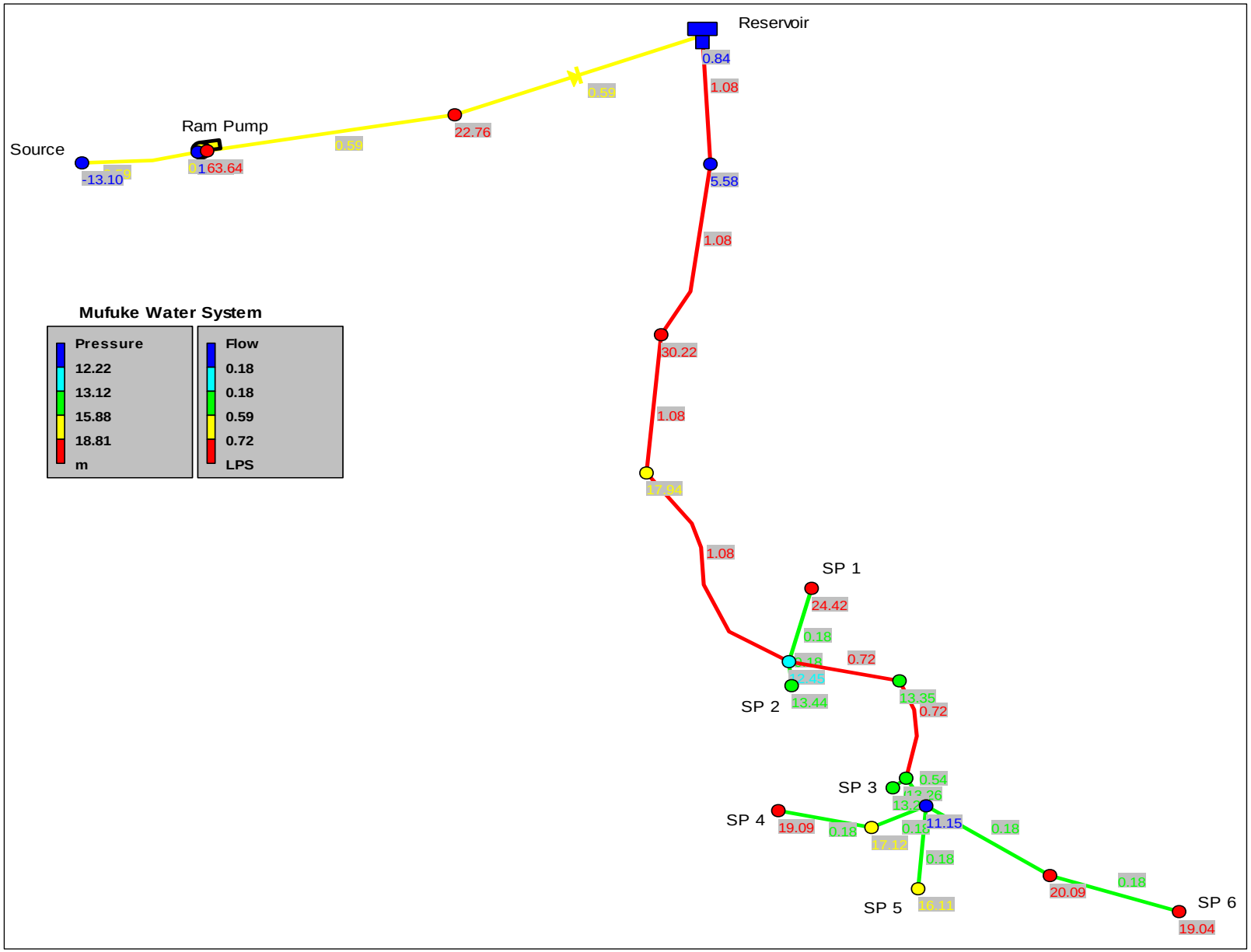


**Figure 51: Flow and Node Pressure for Option 1 (ram pump) - Mufuke**



### 12.5.3 Option 2 – Solar pump with gravity distribution

**Technology description**

Section 3 of this report provides a general description of the components of piped systems supplied by a solar pump. Specifically this option will comprise the following:

- Borehole;
- Submersible pump;
- Solar panel array, rack and controls;
- Transmission line;
- Reservoir siting and location; and
- Distribution network and standpipes.

**Pipe sizing**

The sizing of the pipes was done at a conceptual design level using Epanet. For most pipes in the system the minimum diameter of 50 mm has been selected, with the exception of the 72 mm transmission line to the reservoir, and another 72 mm section of distribution line between the reservoir and tees that branch off to various distribution points. A map of the system along with preliminary hydraulic calculation results are provided in Figures 49, 52 and 53. The following table (Table 28) provides the breakdown of pipe lengths, diameters and materials recommended.

**Table 28: Summary of pipe length, diameter and recommended material (Mufuke)**

| SECTION | MATERIAL | DIA. (mm) | LENGTH (m) |
|---|---|---|---|
| Pump - reservoir | Galvanized iron | 72 | 56 |
| Reservoir - distribution lines | PE or PVC (min. PN 6) | 72 | 757 |
| Distribution lines | PE or PVC (min. PN 6) | 50 | 1248 |
| TOTAL | | | 2061 |

**Figure 52: Pipe diam. & node elevation for option 2 (solar pump) - Mufuke**

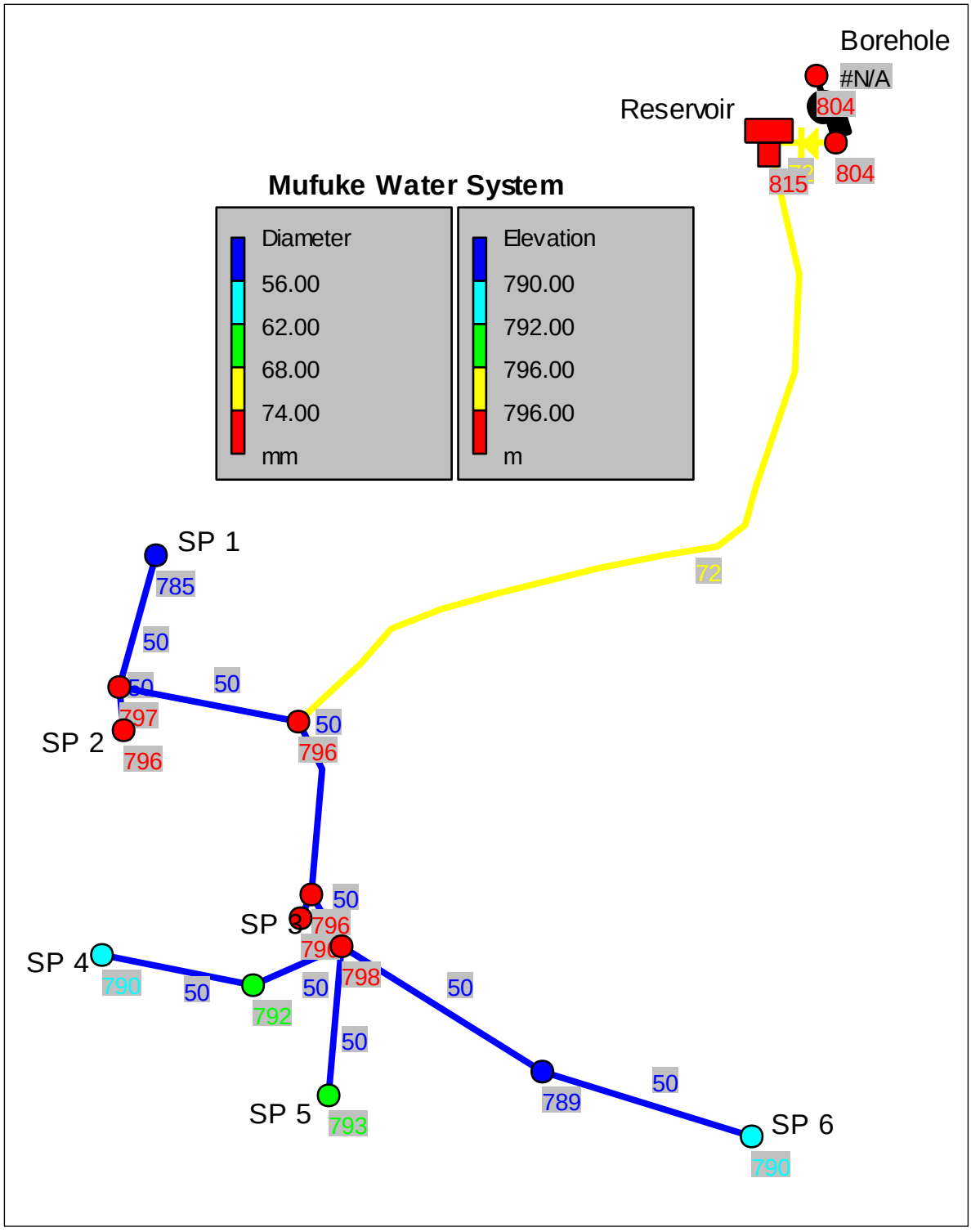
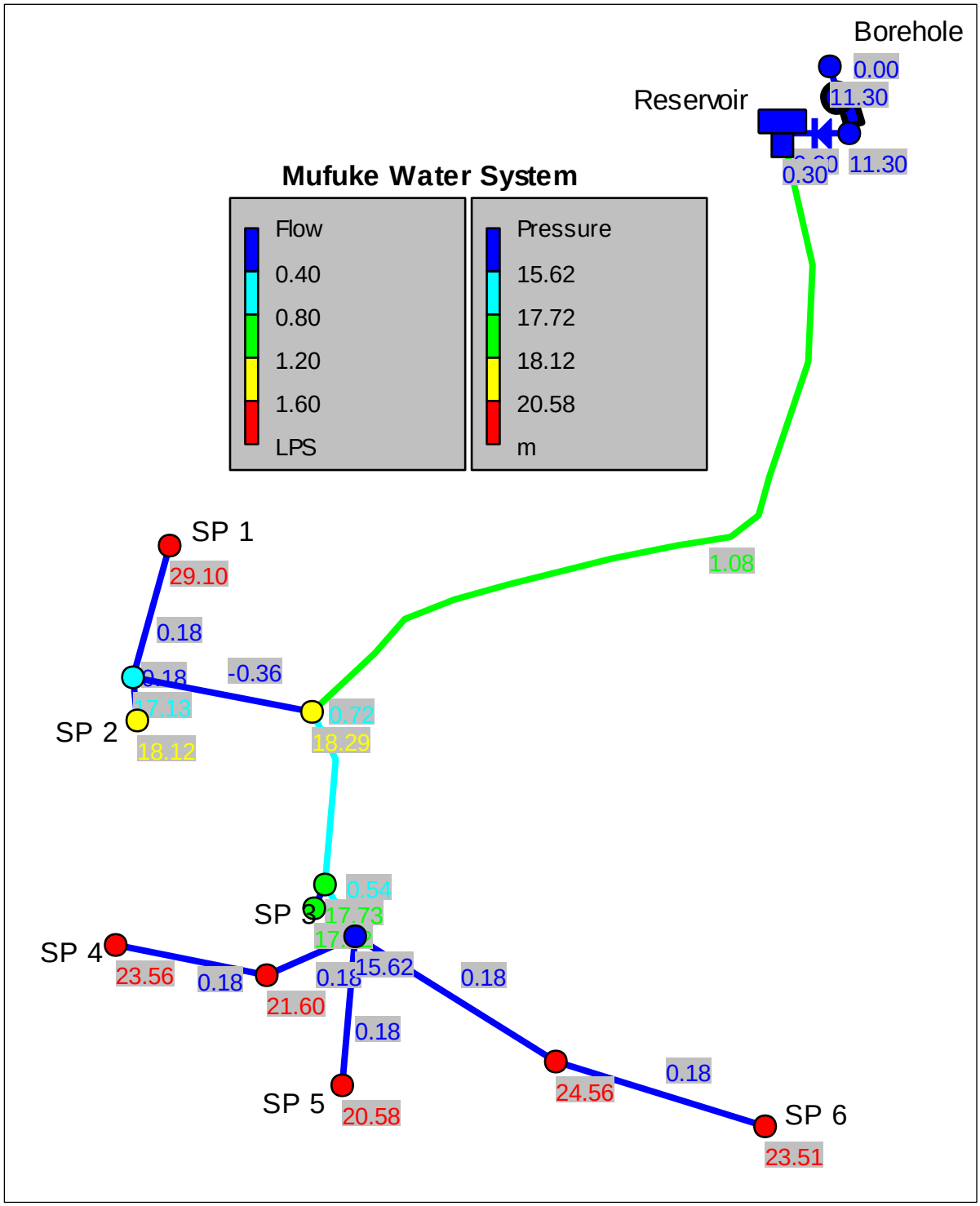


**Figure 53: Flow and node pressure for option 2 (solar pump) - Mufuke**




## Reservoir sizing

The solar pump delivers water to the main reservoir during an estimated 6 hours per day of peak efficiency at a steady flow which corresponds to the total daily demand for the community. The main reservoir delivers water to the distribution network according to a water demand pattern. The demand pattern has a maximum hourly peak factor of 2.0 occurring at high consumption hours, and no demand from 22:00 to 5:00.

The reservoir volume was determined through hydraulic simulations for system balance. A design volume of 36 $m^3$ is recommended for the main reservoir, which is higher than the suggested 40% of total daily peak consumption in the community, but provides extra water storage accounting for the fact that time available for solar pumping during the day is limited. The main reservoir will be located on a relative high point in the community to provide enough pressure in the distribution system.

## 12.6 Costs

The investment and O&M costs for each of the design options are included in Table 29. The costs are based on the design population and the unit costs calculated for the specific type of system. A description of how the unit costs were developed is included in of the NRWSSP Phase 2 Report. The following are included in the unit costs:

- CAPEX: cost of construction, including costs of labour, equipment and material for infrastructure construction; and
- OPEX: cost of operation, maintenance and management, including the cost of routine minor maintenance, minor repairs and operation of the system, and 30% of the necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability.

**Table 29: Investment and O&M costs - Mufuke**

| DESIGN OPTION | QTY | DESIGN POP. | CAPEX / PERSON | TOTAL CAPEX | OPEX / PERSON / YR | TOTAL OPEX / YEAR |
|---|---|---|---|---|---|---|
| 1) Spring / ram pump / piped dist. | 1 | 1,505 | 123.18 | 185,400 | 2.23 | 3,400 |
| 2) Borehole / solar pump / piped dist. | 1 | 1,505 | 153.65 | 231,200 | 5.11 | 7,700 |

# ANNEX B

## Investment plan detailed calculations

**Annex B1: Population projections & water supply targets**
**Annex B2: Capital costs for water supply**
**Annex B3: O&M costs for water supply**
**Annex B4: Sanitation & hygiene promotion costs**
**Annex B5: Capacity building costs**
**Annex B6: Monitoring & reporting costs**
**Annex B7: Programme management costs**

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%)

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%)

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%)

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%)

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | POP. RATE (%) | 2009 POP. EST. (x1000) | 2009 TOTAL ACCESS NO. (x1000) | 2009 TOTAL ACCESS RATE (%) | 2014 POP. EST. (x1000) | 2014 TOTAL ACCESS NO. (x1000) | 2014 TOTAL ACCESS RATE (%) | 2015 POP. EST. (x1000) | 2015 TOTAL ACCESS NO. (x1000) | 2015 TOTAL ACCESS RATE (%) | 2016 POP. EST. (x1000) | 2016 TOTAL ACCESS NO. (x1000) | 2016 TOTAL ACCESS RATE (%) | 2017 POP. EST. (x1000) | 2017 TOTAL ACCESS NO. (x1000) | 2017 TOTAL ACCESS RATE (%) | 2018 POP. EST. (x1000) | 2018 TOTAL ACCESS NO. (x1000) | 2018 TOTAL ACCESS RATE (%) | 2019 POP. EST. (x1000) | 2019 TOTAL ACCESS NO. (x1000) | 2019 TOTAL ACCESS RATE (%) | 2020 POP. EST. (x1000) | 2020 TOTAL ACCESS NO. (x1000) | 2020 TOTAL ACCESS RATE (%) | 2021 POP. EST. (x1000) | 2021 TOTAL ACCESS NO. (x1000) | 2021 TOTAL ACCESS RATE (%) | 2022 POP. EST. (x1000) | 2022 TOTAL ACCESS NO. (x1000) | 2022 TOTAL ACCESS RATE (%) | 2023 POP. EST. (x1000) | 2023 TOTAL ACCESS NO. (x1000) | 2023 TOTAL ACCESS RATE (%) | 2024 POP. EST. (x1000) | 2024 TOTAL ACCESS NO. (x1000) | 2024 TOTAL ACCESS RATE (%) | 2025 POP. EST. (x1000) | 2025 TOTAL ACCESS NO. (x1000) | 2025 TOTAL ACCESS RATE (%) | 2026 POP. EST. (x1000) | 2026 TOTAL ACCESS NO. (x1000) | 2026 TOTAL ACCESS RATE (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECTION BY MUNICIPALITY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | Caxito (Dande) | | | 24.6 | 10.6 | 43% | 26.4 | 10.6 | 40% | 26.7 | 11.2 | 42% | 27.1 | 12.2 | 45% | 27.5 | 13.4 | 49% | 27.9 | 14.9 | 54% | 28.3 | 16.7 | 59% | 28.7 | 18.5 | 65% | 29.1 | 19.9 | 68% | 29.5 | 21.3 | 72% | 29.9 | 22.7 | 76% | 30.3 | 24.0 | 79% | 30.7 | 25.4 | 83% | 31.2 | 26.8 | 86% |
| Bengo | Catete (Icolo e Bengo) | | | 15.0 | 5.6 | 37% | 16.0 | 5.6 | 35% | 16.3 | 6.0 | 37% | 16.5 | 6.6 | 40% | 16.7 | 7.4 | 44% | 17.0 | 8.4 | 49% | 17.2 | 9.6 | 56% | 17.4 | 10.7 | 61% | 17.7 | 11.6 | 66% | 17.9 | 12.5 | 70% | 18.2 | 13.4 | 74% | 18.4 | 14.3 | 77% | 18.7 | 15.2 | 81% | 19.0 | 16.1 | 85% |
| Bengo | Quissama | | | 12.0 | 0.0 | 0% | 12.9 | 0.0 | 0% | 13.1 | 0.5 | 4% | 13.3 | 1.2 | 9% | 13.4 | 2.0 | 15% | 13.6 | 3.2 | 23% | 13.8 | 4.4 | 32% | 14.0 | 5.7 | 41% | 14.2 | 6.7 | 47% | 14.4 | 7.7 | 53% | 14.6 | 8.7 | 60% | 14.8 | 9.7 | 65% | 15.0 | 10.7 | 71% | 15.2 | 11.7 | 77% |
| Bengo | Ambriz | | | 1.9 | 1.5 | 77% | 2.0 | 1.5 | 72% | 2.0 | 1.5 | 73% | 2.1 | 1.5 | 74% | 2.1 | 1.6 | 76% | 2.1 | 1.7 | 78% | 2.2 | 1.7 | 81% | 2.2 | 1.8 | 84% | 2.2 | 1.9 | 86% | 2.2 | 2.0 | 87% | 2.3 | 2.0 | 89% | 2.3 | 2.1 | 91% | 2.3 | 2.2 | 92% | 2.4 | 2.2 | 94% |
| Bengo | Nambuangongo | | | 29.9 | 3.4 | 11% | 32.1 | 3.4 | 11% | 32.5 | 4.5 | 14% | 33.0 | 6.1 | 18% | 33.5 | 8.1 | 24% | 33.9 | 10.6 | 31% | 34.4 | 13.5 | 39% | 34.9 | 16.5 | 47% | 35.4 | 18.7 | 53% | 35.9 | 21.0 | 58% | 36.4 | 23.2 | 64% | 36.9 | 25.5 | 69% | 37.4 | 27.8 | 74% | 37.9 | 30.0 | 79% |
| Bengo | Bula - Atumba | | | 4.3 | 0.0 | 0% | 4.6 | 0.0 | 0% | 4.6 | 0.2 | 4% | 4.7 | 0.4 | 9% | 4.8 | 0.7 | 15% | 4.8 | 1.1 | 23% | 4.9 | 1.6 | 32% | 5.0 | 2.0 | 41% | 5.1 | 2.4 | 47% | 5.1 | 2.7 | 53% | 5.2 | 3.1 | 60% | 5.3 | 3.4 | 65% | 5.3 | 3.8 | 71% | 5.4 | 4.2 | 77% |
| Bengo | Dembos | | | 20.9 | 2.7 | 13% | 22.4 | 2.7 | 12% | 22.7 | 3.4 | 15% | 23.0 | 4.5 | 20% | 23.3 | 5.9 | 25% | 23.6 | 7.6 | 32% | 24.0 | 9.6 | 40% | 24.3 | 11.6 | 48% | 24.6 | 13.2 | 54% | 25.0 | 14.7 | 59% | 25.3 | 16.3 | 64% | 25.7 | 17.9 | 70% | 26.0 | 19.4 | 75% | 26.4 | 21.0 | 79% |
| Bengo | Pango - Aluquém | | | 7.5 | 1.4 | 19% | 8.0 | 1.4 | 18% | 8.1 | 1.7 | 21% | 8.3 | 2.1 | 25% | 8.4 | 2.5 | 30% | 8.5 | 3.1 | 37% | 8.6 | 3.8 | 44% | 8.7 | 4.5 | 51% | 8.8 | 5.0 | 57% | 9.0 | 5.5 | 62% | 9.1 | 6.1 | 67% | 9.2 | 6.6 | 72% | 9.4 | 7.1 | 76% | 9.5 | 7.7 | 81% |
| Benguela | Baía Farta | | | 10.9 | 9.2 | 84% | 11.7 | 9.2 | 79% | 11.9 | 9.3 | 79% | 12.0 | 9.6 | 80% | 12.2 | 9.9 | 81% | 12.4 | 10.3 | 83% | 12.5 | 10.7 | 85% | 12.7 | 11.1 | 87% | 12.9 | 11.5 | 89% | 13.1 | 11.8 | 90% | 13.3 | 12.1 | 91% | 13.4 | 12.5 | 93% | 13.6 | 12.8 | 94% | 13.8 | 13.1 | 95% |
| Benguela | Lobito | | | 43.0 | 10.2 | 24% | 46.1 | 10.2 | 22% | 46.7 | 11.5 | 25% | 47.4 | 13.6 | 29% | 48.0 | 16.2 | 34% | 48.7 | 19.4 | 40% | 49.4 | 23.2 | 47% | 50.1 | 27.0 | 54% | 50.8 | 29.9 | 59% | 51.5 | 32.8 | 64% | 52.2 | 35.8 | 69% | 52.9 | 38.7 | 73% | 53.7 | 41.6 | 78% | 54.4 | 44.5 | 82% |
| Benguela | Cubal | | | 88.8 | 18.5 | 21% | 95.2 | 18.5 | 19% | 96.5 | 21.4 | 22% | 97.9 | 25.8 | 26% | 99.2 | 31.2 | 31% | 100.6 | 38.2 | 38% | 102.0 | 46.2 | 45% | 103.5 | 54.2 | 52% | 104.9 | 60.4 | 58% | 106.4 | 66.6 | 63% | 107.9 | 72.8 | 67% | 109.4 | 79.0 | 72% | 110.9 | 85.1 | 77% | 112.5 | 91.3 | 81% |
| Benguela | Ganda | | | 55.6 | 12.5 | 22% | 59.6 | 12.5 | 21% | 60.5 | 14.3 | 24% | 61.3 | 17.0 | 28% | 62.2 | 20.4 | 33% | 63.1 | 24.6 | 39% | 63.9 | 29.6 | 46% | 64.8 | 34.5 | 53% | 65.7 | 38.4 | 58% | 66.7 | 42.2 | 63% | 67.6 | 46.0 | 68% | 68.5 | 49.8 | 73% | 69.5 | 53.7 | 77% | 70.5 | 57.5 | 82% |
| Benguela | Balombo | | | 32.4 | 12.9 | 40% | 34.7 | 12.9 | 37% | 35.2 | 13.8 | 39% | 35.7 | 15.1 | 42% | 36.2 | 16.7 | 46% | 36.7 | 18.8 | 51% | 37.2 | 21.3 | 57% | 37.7 | 23.7 | 63% | 38.3 | 25.6 | 67% | 38.8 | 27.5 | 71% | 39.3 | 29.4 | 75% | 39.9 | 31.2 | 78% | 40.5 | 33.1 | 82% | 41.0 | 35.0 | 85% |
| Benguela | Bocoio | | | 57.3 | 18.5 | 32% | 61.4 | 18.5 | 30% | 62.3 | 20.2 | 32% | 63.2 | 22.7 | 36% | 64.0 | 25.9 | 40% | 64.9 | 29.9 | 46% | 65.8 | 34.6 | 52% | 66.8 | 39.2 | 59% | 67.7 | 42.8 | 63% | 68.6 | 46.4 | 68% | 69.6 | 50.0 | 72% | 70.6 | 53.6 | 76% | 71.6 | 57.2 | 80% | 72.6 | 60.7 | 84% |
| Benguela | Caimbambo | | | 12.7 | 5.5 | 43% | 13.6 | 5.5 | 40% | 13.8 | 5.8 | 42% | 14.0 | 6.3 | 45% | 14.2 | 7.0 | 49% | 14.4 | 7.8 | 54% | 14.6 | 8.7 | 59% | 14.8 | 9.6 | 65% | 15.0 | 10.3 | 69% | 15.2 | 11.0 | 72% | 15.5 | 11.7 | 76% | 15.7 | 12.4 | 79% | 15.9 | 13.2 | 83% | 16.1 | 13.9 | 86% |
| Benguela | Chongoroi | | | 6.5 | 5.8 | 89% | 7.0 | 5.8 | 83% | 7.1 | 5.9 | 83% | 7.2 | 6.0 | 84% | 7.3 | 6.2 | 85% | 7.4 | 6.4 | 86% | 7.5 | 6.6 | 88% | 7.6 | 6.8 | 90% | 7.7 | 7.0 | 91% | 7.8 | 7.2 | 92% | 7.9 | 7.4 | 93% | 8.0 | 7.6 | 94% | 8.1 | 7.7 | 95% | 8.2 | 7.9 | 96% |
| Bié | Andulo | | | 64.3 | 2.6 | 4% | 69.0 | 2.6 | 4% | 69.9 | 5.0 | 7% | 70.9 | 8.7 | 12% | 71.9 | 13.2 | 18% | 72.9 | 19.0 | 26% | 73.9 | 25.6 | 35% | 75.0 | 32.3 | 43% | 76.0 | 37.4 | 49% | 77.1 | 42.6 | 55% | 78.2 | 47.7 | 61% | 79.2 | 52.9 | 67% | 80.4 | 58.0 | 72% | 81.5 | 63.2 | 78% |
| Bié | Camacupa | | | 39.9 | 1.4 | 3% | 42.8 | 1.4 | 3% | 43.4 | 2.9 | 7% | 44.0 | 5.1 | 12% | 44.6 | 8.0 | 18% | 45.2 | 11.6 | 26% | 45.9 | 15.7 | 34% | 46.5 | 19.9 | 43% | 47.2 | 23.1 | 49% | 47.8 | 26.3 | 55% | 48.5 | 29.5 | 61% | 49.2 | 32.7 | 67% | 49.8 | 35.9 | 72% | 50.5 | 39.1 | 77% |
| Bié | Catabola | | | 46.5 | 5.5 | 12% | 49.9 | 5.5 | 11% | 50.6 | 7.1 | 14% | 51.3 | 9.6 | 19% | 52.0 | 12.7 | 24% | 52.7 | 16.6 | 32% | 53.4 | 21.1 | 40% | 54.2 | 25.7 | 47% | 55.0 | 29.2 | 53% | 55.7 | 32.7 | 59% | 56.5 | 36.2 | 64% | 57.3 | 39.7 | 69% | 58.1 | 43.2 | 74% | 58.9 | 46.7 | 79% |
| Bié | Chinguar | | | 33.3 | 1.1 | 3% | 35.6 | 1.1 | 3% | 36.1 | 2.4 | 7% | 36.7 | 4.3 | 12% | 37.2 | 6.6 | 18% | 37.7 | 9.6 | 26% | 38.2 | 13.1 | 34% | 38.7 | 16.6 | 43% | 39.3 | 19.2 | 49% | 39.8 | 21.9 | 55% | 40.4 | 24.6 | 61% | 41.0 | 27.3 | 67% | 41.5 | 29.9 | 72% | 42.1 | 32.6 | 77% |
| Bié | Chitembo | | | 13.6 | 4.0 | 29% | 14.6 | 4.0 | 27% | 14.8 | 4.4 | 30% | 15.0 | 5.0 | 34% | 15.2 | 5.8 | 38% | 15.4 | 6.8 | 44% | 15.6 | 7.9 | 51% | 15.9 | 9.1 | 57% | 16.1 | 9.9 | 62% | 16.3 | 10.8 | 66% | 16.5 | 11.7 | 71% | 16.8 | 12.6 | 75% | 17.0 | 13.4 | 79% | 17.2 | 14.3 | 83% |
| Bié | Cuemba | | | 4.2 | 1.8 | 42% | 4.5 | 1.8 | 39% | 4.5 | 1.9 | 41% | 4.6 | 2.0 | 44% | 4.7 | 2.2 | 48% | 4.7 | 2.5 | 53% | 4.8 | 2.8 | 59% | 4.9 | 3.1 | 64% | 4.9 | 3.3 | 68% | 5.0 | 3.6 | 72% | 5.1 | 3.8 | 75% | 5.1 | 4.1 | 79% | 5.2 | 4.3 | 82% | 5.3 | 4.5 | 86% |
| Bié | Cunhinga (Vouga) | | | 18.9 | 0.0 | 0% | 20.2 | 0.0 | 0% | 20.5 | 0.8 | 4% | 20.8 | 1.9 | 9% | 21.1 | 3.2 | 15% | 21.4 | 5.0 | 23% | 21.7 | 7.0 | 32% | 22.0 | 9.0 | 41% | 22.3 | 10.5 | 47% | 22.6 | 12.1 | 54% | 22.9 | 13.7 | 60% | 23.2 | 15.2 | 65% | 23.5 | 16.8 | 71% | 23.9 | 18.3 | 77% |
| Bié | Kuito | | | 178.2 | 37.3 | 21% | 191.1 | 37.3 | 20% | 193.7 | 43.2 | 22% | 196.4 | 51.9 | 26% | 199.2 | 62.9 | 32% | 202.0 | 76.7 | 38% | 204.8 | 92.8 | 45% | 207.7 | 108.9 | 52% | 210.6 | 121.3 | 58% | 213.5 | 133.7 | 63% | 216.5 | 146.1 | 67% | 219.6 | 158.5 | 72% | 222.6 | 171.0 | 77% | 225.7 | 183.4 | 81% |
| Bié | Nharea | | | 26.8 | 2.5 | 9% | 28.8 | 2.5 | 9% | 29.2 | 3.5 | 12% | 29.6 | 4.9 | 17% | 30.0 | 6.7 | 22% | 30.4 | 9.0 | 30% | 30.8 | 11.7 | 38% | 31.3 | 14.4 | 46% | 31.7 | 16.4 | 52% | 32.1 | 18.5 | 58% | 32.6 | 20.5 | 63% | 33.0 | 22.6 | 68% | 33.5 | 24.7 | 74% | 34.0 | 26.7 | 79% |
| Cabinda | Belize | | | 7.1 | 2.3 | 33% | 7.6 | 2.3 | 31% | 7.7 | 2.5 | 33% | 7.8 | 2.9 | 37% | 7.9 | 3.2 | 41% | 8.0 | 3.7 | 47% | 8.1 | 4.3 | 53% | 8.3 | 4.9 | 59% | 8.4 | 5.3 | 64% | 8.5 | 5.8 | 68% | 8.6 | 6.2 | 72% | 8.7 | 6.6 | 76% | 8.9 | 7.1 | 80% | 9.0 | 7.5 | 84% |
| Cabinda | Buco Zau | | | 12.8 | 3.0 | 23% | 13.7 | 3.0 | 22% | 13.9 | 3.4 | 24% | 14.1 | 4.0 | 29% | 14.3 | 4.8 | 33% | 14.5 | 5.8 | 40% | 14.7 | 6.9 | 47% | 14.9 | 8.0 | 54% | 15.1 | 8.9 | 59% | 15.4 | 9.8 | 64% | 15.6 | 10.7 | 68% | 15.8 | 11.5 | 73% | 16.0 | 12.4 | 77% | 16.2 | 13.3 | 82% |
| Cabinda | Cabinda | | | 27.4 | 1.9 | 7% | 29.3 | 1.9 | 7% | 29.7 | 2.9 | 10% | 30.2 | 4.4 | 15% | 30.6 | 6.3 | 21% | 31.0 | 8.7 | 28% | 31.4 | 11.5 | 37% | 31.9 | 14.3 | 45% | 32.3 | 16.4 | 51% | 32.8 | 18.5 | 57% | 33.2 | 20.7 | 62% | 33.7 | 22.8 | 68% | 34.2 | 25.0 | 73% | 34.7 | 27.1 | 78% |
| Cabinda | Cacongo | | | 16.8 | 0.0 | 0% | 18.0 | 0.0 | 0% | 18.2 | 0.7 | 4% | 18.5 | 1.6 | 9% | 18.7 | 2.9 | 15% | 19.0 | 4.4 | 23% | 19.3 | 6.2 | 32% | 19.5 | 8.0 | 41% | 19.8 | 9.4 | 47% | 20.1 | 10.8 | 53% | 20.4 | 12.1 | 60% | 20.7 | 13.5 | 65% | 21.0 | 14.9 | 71% | 21.2 | 16.3 | 77% |
| Cunene | Cahama | | | 11.5 | 4.6 | 40% | 12.3 | 4.6 | 37% | 12.5 | 4.9 | 39% | 12.7 | 5.4 | 43% | 12.9 | 6.0 | 47% | 13.0 | 6.7 | 52% | 13.2 | 7.6 | 57% | 13.4 | 8.5 | 63% | 13.6 | 9.1 | 67% | 13.8 | 9.8 | 71% | 14.0 | 10.5 | 75% | 14.2 | 11.1 | 78% | 14.4 | 11.8 | 82% | 14.6 | 12.5 | 85% |
| Cunene | Cuanhama | | | 80.3 | 5.8 | 7% | 86.1 | 5.8 | 7% | 87.3 | 8.8 | 10% | 88.5 | 13.2 | 15% | 89.8 | 18.7 | 21% | 91.0 | 25.7 | 28% | 92.3 | 33.8 | 37% | 93.6 | 42.0 | 45% | 94.9 | 48.2 | 51% | 96.2 | 54.5 | 57% | 97.6 | 60.8 | 62% | 99.0 | 67.1 | 68% | 100.3 | 73.3 | 73% | 101.8 | 79.6 | 78% |
| Cunene | Curoca | | | 15.7 | 5.7 | 37% | 16.8 | 5.7 | 34% | 17.1 | 6.2 | 36% | 17.3 | 6.9 | 40% | 17.6 | 7.7 | 44% | 17.8 | 8.7 | 49% | 18.0 | 10.0 | 55% | 18.3 | 11.2 | 61% | 18.6 | 12.1 | 65% | 18.8 | 13.1 | 69% | 19.1 | 14.0 | 73% | 19.3 | 14.9 | 77% | 19.6 | 15.9 | 81% | 19.9 | 16.8 | 85% |
| Cunene | Cuvelai | | | 48.4 | 2.4 | 5% | 51.8 | 2.4 | 5% | 52.6 | 4.2 | 8% | 53.3 | 6.9 | 13% | 54.0 | 10.3 | 19% | 54.8 | 14.6 | 27% | 55.6 | 19.6 | 35% | 56.3 | 24.5 | 44% | 57.1 | 28.4 | 50% | 57.9 | 32.2 | 56% | 58.7 | 36.1 | 61% | 59.6 | 39.9 | 67% | 60.4 | 43.8 | 72% | 61.2 | 47.6 | 78% |
| Cunene | Namacunde | | | 38.3 | 4.8 | 13% | 41.0 | 4.8 | 12% | 41.6 | 6.1 | 15% | 42.2 | 8.2 | 19% | 42.8 | 10.7 | 25% | 43.4 | 13.9 | 32% | 44.0 | 17.6 | 40% | 44.6 | 21.3 | 48% | 45.2 | 24.2 | 53% | 45.8 | 27.0 | 59% | 46.5 | 29.9 | 64% | 47.1 | 32.8 | 69% | 47.8 | 35.6 | 75% | 48.5 | 38.5 | 79% |
| Cunene | Ombadja | | | 79.6 | 4.3 | 5% | 85.4 | 4.3 | 5% | 86.5 | 7.3 | 8% | 87.8 | 11.8 | 13% | 89.0 | 17.3 | 19% | 90.2 | 24.4 | 27% | 91.5 | 32.5 | 36% | 92.8 | 40.7 | 44% | 94.1 | 47.0 | 50% | 95.4 | 53.3 | 56% | 96.7 | 59.6 | 62% | 98.1 | 65.9 | 67% | 99.5 | 72.2 | 73% | 100.8 | 78.5 | 78% |
| Huambo | Bailundo | | | 80.1 | 11.5 | 14% | 85.9 | 11.5 | 13% | 87.1 | 18.4 | 21% | 88.3 | 33.0 | 37% | 89.5 | 49.7 | 56% | 90.8 | 62.9 | 69% | 92.0 | 69.8 | 76% | 93.3 | 72.3 | 77% | 94.6 | 73.7 | 78% | 96.0 | 75.2 | 78% | 97.3 | 76.6 | 79% | 98.7 | 78.1 | 79% | 100.1 | 79.5 | 79% | 101.5 | 81.0 | 80% |
| Huambo | Caála | | | 52.7 | 13.9 | 26% | 56.5 | 13.9 | 25% | 57.3 | 18.0 | 31% | 58.1 | 26.7 | 46% | 58.9 | 36.5 | 62% | 59.8 | 44.4 | 74% | 60.6 | 48.5 | 80% | 61.4 | 49.9 | 81% | 62.3 | 50.8 | 81% | 63.2 | 51.6 | 82% | 64.1 | 52.5 | 82% | 65.0 | 53.3 | 82% | 65.9 | 54.2 | 82% | 66.8 | 55.0 | 82% |
| Huambo | Cathihungo | | | 41.2 | 8.8 | 21% | 44.2 | 8.8 | 20% | 44.8 | 12.2 | 27% | 45.4 | 19.3 | 42% | 46.1 | 27.3 | 59% | 46.7 | 33.7 | 72% | 47.4 | 37.1 | 78% | 48.0 | 38.3 | 80% | 48.7 | 39.0 | 80% | 49.4 | 39.7 | 80% | 50.1 | 40.4 | 81% | 50.8 | 41.1 | 81% | 51.5 | 41.8 | 81% | 52.2 | 42.5 | 81% |
| Huambo | Ecunha | | | 13.8 | 3.9 | 28% | 14.8 | 3.9 | 26% | 15.0 | 5.0 | 33% | 15.2 | 7.2 | 47% | 15.5 | 9.7 | 63% | 15.7 | 11.8 | 75% | 15.9 | 12.8 | 81% | 16.1 | 13.2 | 82% | 16.3 | 13.4 | 82% | 16.6 | 13.6 | 82% | 16.8 | 13.9 | 82% | 17.0 | 14.1 | 83% | 17.3 | 14.3 | 83% | 17.5 | 14.5 | 83% |
| Huambo | Huambo | | | 64.6 | 11.0 | 17% | 69.3 | 11.0 | 16% | 70.2 | 16.5 | 24% | 71.2 | 28.0 | 39% | 72.2 | 41.1 | 57% | 73.2 | 51.5 | 70% | 74.2 | 57.0 | 77% | 75.3 | 58.9 | 78% | 76.3 | 60.1 | 79% | 77.4 | 61.2 | 79% | 78.5 | 62.4 | 79% | 79.6 | 63.5 | 80% | 80.7 | 64.6 | 80% | 81.8 | 65.8 | 80% |
| Huambo | Londuimbali | | | 36.5 | 16.4 | 45% | 39.1 | 16.4 | 42% | 39.7 | 18.8 | 47% | 40.2 | 23.7 | 59% | 40.8 | 29.4 | 72% | 41.4 | 33.9 | 82% | 41.9 | 36.2 | 86% | 42.5 | 37.0 | 87% | 43.1 | 37.5 | 87% | 43.7 | 38.0 | 87% | 44.3 | 38.5 | 87% | 45.0 | 39.0 | 87% | 45.6 | 39.5 | 87% | 46.2 | 40.0 | 86% |
| Huambo | Longonjo | | | 24.6 | 5.5 | 23% | 26.4 | 5.5 | 21% | 26.7 | 7.5 | 28% | 27.1 | 11.7 | 43% | 27.5 | 16.5 | 60% | 27.9 | 20.2 | 73% | 28.3 | 22.2 | 79% | 28.7 | 22.9 | 80% | 29.1 | 23.3 | 80% | 29.5 | 23.8 | 81% | 29.9 | 24.2 | 81% | 30.3 | 24.6 | 81% | 30.7 | 25.0 | 81% | 31.1 | 25.4 | 82% |
| Huambo | Mungo | | | 15.0 | 2.3 | 15% | 16.1 | 2.3 | 14% | 16.3 | 3.6 | 22% | 16.5 | 6.3 | 38% | 16.8 | 9.4 | 56% | 17.0 | 11.8 | 70% | 17.2 | 13.1 | 76% | 17.5 | 13.6 | 78% | 17.7 | 13.9 | 78% | 18.0 | 14.1 | 79% | 18.2 | 14.4 | 79% | 18.5 | 14.7 | 79% | 18.7 | 14.9 | 80% | 19.0 | 15.2 | 80% |
| Huambo | Tchicala-Tcholohanga | | | 36.1 | 7.3 | 20% | 38.7 | 7.3 | 19% | 39.3 | 10.3 | 26% | 39.8 | 16.6 | 42% | 40.4 | 23.7 | 59% | 40.9 | 29.4 | 72% | 41.5 | 32.3 | 78% | 42.1 | 33.4 | 79% | 42.7 | 34.0 | 80% | 43.3 | 34.6 | 80% | 43.9 | 35.2 | 80% | 44.5 | 35.9 | 81% | 45.1 | 36.5 | 81% | 45.7 | 37.1 | 81% |
| Huambo | Tchindjenje | | | 6.1 | 2.0 | 32% | 6.5 | 2.0 | 30% | 6.6 | 2.4 | 37% | 6.7 | 3.3 | 50% | 6.8 | 4.4 | 65% | 6.9 | 5.3 | 77% | 7.0 | 5.7 | 82% | 7.1 | 5.9 | 83% | 7.2 | 6.0 | 83% | 7.3 | 6.1 | 83% | 7.4 | 6.1 | 83% | 7.5 | 6.2 | 84% | 7.6 | 6.3 | 84% | 7.7 | 6.4 | 84% |
| Huambo | Ucuma | | | 4.6 | 1.0 | 22% | 4.9 | 1.0 | 21% | 5.0 | 1.4 | 28% | 5.0 | 2.2 | 43% | 5.1 | 3.1 | 60% | 5.2 | 3.8 | 73% | 5.2 | 4.1 | 79% | 5.3 | 4.3 | 80% | 5.4 | 4.3 | 80% | 5.5 | 4.4 | 81% | 5.5 | 4.5 | 81% | 5.6 | 4.6 | 81% | 5.7 | 4.6 | 81% | 5.8 | 4.7 | 82% |
| Huíla | Caconda | | | 97.7 | 20.6 | 21% | 104.7 | 20.6 | 20% | 106.2 | 23.8 | 22% | 107.7 | 28.6 | 27% | 109.2 | 34.6 | 32% | 110.7 | 42.2 | 38% | 112.3 | 51.0 | 45% | 113.8 | 59.8 | 53% | 115.4 | 66.6 | 58% | 117.0 | 73.4 | 63% | 118.7 | 80.2 | 68% | 120.3 | 87.0 | 72% | 122.0 | 93.8 | 77% | 123.7 | 100.6 | 81% |
| Huíla | Cacula | | | 24.5 | 5.2 | 21% | 26.3 | 5.2 | 20% | 26.6 | 6.0 | 22% | 27.0 | 7.2 | 27% | 27.4 | 8.7 | 32% | 27.8 | 10.6 | 38% | 28.2 | 12.8 | 45% | 28.6 | 15.0 | 53% | 29.0 | 16.7 | 58% | 29.4 | 18.4 | 63% | 29.8 | 20.1 | 68% | 30.2 | 21.8 | 72% | 30.6 | 23.5 | 77% | 31.0 | 25.2 | 81% |
| Huíla | Caluquembe | | | 27.8 | 6.9 | 25% | 29.8 | 6.9 | 23% | 30.2 | 7.7 | 26% | 30.6 | 9.1 | 30% | 31.1 | 10.7 | 34% | 31.5 | 12.8 | 41% | 31.9 | 15.2 | 48% | 32.4 | 17.6 | 54% | 32.8 | 19.5 | 59% | 33.3 | 21.4 | 64% | 33.8 | 23.3 | 69% | 34.2 | 25.1 | 73% | 34.7 | 27.0 | 78% | 35.2 | 28.9 | 82% |
| Huíla | Chibia | | | 8.0 | 6.8 | 85% | 8.6 | 6.8 | 79% | 8.7 | 6.9 | 80% | 8.8 | 7.1 | 80% | 9.0 | 7.3 | 82% | 9.1 | 7.6 | 84% | 9.2 | 7.9 | 86% | 9.4 | 8.2 | 88% | 9.5 | 8.5 | 89% | 9.6 | 8.7 | 91% | 9.8 | 9.0 | 92% | 9.9 | 9.2 | 93% | 10.0 | 9.4 | 94% | 10.2 | 9.7 | 95% |
| Huíla | Chicomba | | | 15.2 | 6.0 | 40% | 16.3 | 6.0 | 37% | 16.5 | 6.4 | 39% | 16.7 | 7.0 | 42% | 17.0 | 7.8 | 46% | 17.2 | 8.8 | 51% | 17.4 | 9.9 | 57% | 17.7 | 11.1 | 63% | 17.9 | 12.0 | 67% | 18.2 | 12.9 | 71% | 18.4 | 13.7 | 75% | 18.7 | 14.6 | 78% | 19.0 | 15.5 | 82% | 19.2 | 16.4 | 85% |
| Huíla | Chipindo | | | 1.7 | 0.8 | 47% | 1.8 | 0.8 | 44% | 1.8 | 0.8 | 46% | 1.9 | 0.9 | 49% | 1.9 | 1.0 | 52% | 1.9 | 1.1 | 57% | 1.9 | 1.2 | 62% | 2.0 | 1.3 | 67% | 2.0 | 1.4 | 71% | 2.0 | 1.5 | 74% | 2.1 | 1.6 | 77% | 2.1 | 1.7 | 81% | 2.1 | 1.8 | 84% | 2.1 | 1.9 | 87% |
| Huíla | Gambos | | | 31.5 | 24.8 | 79% | 33.7 | 24.8 | 73% | 34.2 | 25.3 | 74% | 34.7 | 26.0 | 75% | 35.2 | 27.0 | 77% | 35.7 | 28.2 | 79% | 36.2 | 29.6 | 82% | 36.7 | 31.0 | 84% | 37.2 | 32.0 | 86% | 37.7 | 33.1 | 88% | 38.2 | 34.2 | 89% | 38.8 | 35.2 | 91% | 39.3 | 36.3 | 92% | 39.9 | 37.4 | 94% |
| Huíla | Humpata | | | 31.6 | 6.4 | 20% | 33.8 | 6.4 | 19% | 34.3 | 7.4 | 22% | 34.8 | 9.0 | 26% | 35.3 | 10.9 | 31% | 35.8 | 13.4 | 37% | 36.3 | 16.3 | 45% | 36.8 | 19.1 | 52% | 37.3 | 21.3 | 57% | 37.8 | 23.6 | 62% | 38.3 | 25.8 | 67% | 38.9 | 28.0 | 72% | 39.4 | 30.2 | 77% | 40.0 | 32.4 | 81% |
| Huíla | Jamba | | | 33.5 | 4.9 | 15% | 35.9 | 4.9 | 14% | 36.4 | 6.1 | 17% | 37.0 | 7.8 | 21% | 37.5 | 10.0 | 27% | 38.0 | 12.8 | 34% | 38.5 | 15.9 | 41% | 39.1 | 19.1 | 49% | 39.6 | 21.6 | 55% | 40.2 | 24.1 | 60% | 40.7 | 26.5 | 65% | 41.3 | 29.0 | 70% | 41.9 | 31.5 | 75% | 42.5 | 33.9 | 80% |
| Huíla | Kuvango | | | 22.7 | 8.9 | 39% | 24.4 | 8.9 | 37% | 24.7 | 9.5 | 39% | 25.1 | 10.5 | 42% | 25.4 | 11.7 | 46% | 25.8 | 13.1 | 51% | 26.1 | 14.9 | 57% | 26.5 | 16.6 | 63% | 26.9 | 17.9 | 67% | 27.2 | 19.2 | 71% | 27.6 | 20.6 | 74% | 28.0 | 21.9 | 78% | 28.4 | 23.2 | 82% | 28.8 | 24.5 | 85% |
| Huíla | Lubango | | | 121.9 | 26.9 | 22% | 130.7 | 26.9 | 21% | 132.5 | 30.9 | 23% | 134.4 | 36.8 | 27% | 136.3 | 44.2 | 32% | 138.2 | 53.6 | 39% | 140.1 | 64.5 | 46% | 142.1 | 75.4 | 53% | 144.1 | 83.8 | 58% | 146.1 | 92.2 | 63% | 148.1 | 100.6 | 68% | 150.2 | 109.0 | 73% | 152.3 | 117.4 | 77% | 154.4 | 125.8 | 81% |
| Huíla | Matala | | | 126.0 | 19.7 | 16% | 135.1 | 19.7 | 15% | 136.9 | 24.0 | 18% | 138.9 | 30.5 | 22% | 140.8 | 38.6 | 27% | 142.8 | 48.9 | 34% | 144.8 | 60.8 | 42% | 146.8 | 72.7 | 50% | 148.9 | 81.9 | 55% | 150.9 | 91.0 | 60% | 153.1 | 100.2 | 65% | 155.2 | 109.4 | 71% | 157.4 | 118.6 | 75% | 159.6 | 127.8 | 80% |
| Huíla | Quilengues | | | 26.7 | 7.0 | 26% | 28.6 | 7.0 | 24% | 29.0 | 7.8 | 27% | 29.4 | 9.1 | 31% | 29.8 | 10.6 | 36% | 30.3 | 12.6 | 42% | 30.7 | 14.9 | 49% | 31.1 | 17.2 | 55% | 31.5 | 19.0 | 60% | 32.0 | 20.8 | 65% | 32.4 | 22.5 | 69% | 32.9 | 24.3 | 74% | 33.3 | 26.1 | 78% | 33.8 | 27.9 | 82% |
| Huíla | Quipungo | | | 83.0 | 12.6 | 15% | 89.0 | 12.6 | 14% | 90.2 | 15.4 | 17% | 91.5 | 19.7 | 22% | 92.8 | 25.1 | 27% | 94.1 | 31.9 | 34% | 95.4 | 39.7 | 42% | 96.7 | 47.6 | 49% | 98.1 | 53.7 | 55% | 99.5 | 59.8 | 60% | 100.8 | 65.8 | 65% | 102.3 | 71.9 | 70% | 103.7 | 78.0 | 75% | 105.1 | 84.1 | 80% |
| Kuando Kubi | Calai | | | 1.6 | 0.0 | 0% | 1.7 | 0.0 | 0% | 1.7 | 0.1 | 4% | 1.8 | 0.2 | 9% | 1.8 | 0.3 | 15% | 1.8 | 0.4 | 23% | 1.8 | 0.6 | 32% | 1.9 | 0.8 | 41% | 1.9 | 0.9 | 47% | 1.9 | 1.0 | 53% | 1.9 | 1.2 | 60% | 2.0 | 1.3 | 65% | 2.0 | 1.4 | 71% | 2.0 | 1.6 | 77% |
| Kuando Kubi | Cuangar | | | 6.6 | 0.0 | 0% | 7.1 | 0.0 | 0% | 7.2 | 0.3 | 4% | 7.3 | 0.6 | 9% | 7.4 | 1.1 | 15% | 7.5 | 1.7 | 23% | 7.6 | 2.4 | 32% | 7.7 | 3.2 | 41% | 7.8 | 3.7 | 47% | 7.9 | 4.2 | 53% | 8.1 | 4.8 | 60% | 8.2 | 5.3 | 65% | 8.3 | 5.9 | 71% | 8.4 | 6.4 | 77% |
| Kuando Kubi | Cuchi | | | 13.0 | 0.0 | 0% | 13.9 | 0.0 | 0% | 14.1 | 0.5 | 4% | 14.3 

## ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) |
| Luanda | Sambizanga | | | | 96.4 | 0.0 | 0% | 103.3 | 0.0 | 0% | 104.8 | 3.7 | 4% | 106.3 | 9.4 | 9% | 107.7 | 16.4 | 15% | 109.3 | 25.3 | 23% | 110.8 | 35.6 | 32% | 112.3 | 45.9 | 41% | 113.9 | 53.8 | 47% | 115.5 | 61.8 | 53% | 117.1 | 69.7 | 60% | 118.8 | 77.7 | 65% | 120.4 | 85.7 | 71% | 122.1 | 93.6 | 77% |
| Lunda - Norte | Cambulo | | | | 11.3 | 7.4 | 65% | 12.1 | 7.4 | 61% | 12.3 | 7.6 | 62% | 12.5 | 8.0 | 64% | 12.6 | 8.4 | 66% | 12.8 | 8.9 | 70% | 13.0 | 9.5 | 73% | 13.2 | 10.2 | 77% | 13.4 | 10.6 | 80% | 13.5 | 11.1 | 82% | 13.7 | 11.6 | 84% | 13.9 | 12.1 | 87% | 14.1 | 12.5 | 89% | 14.3 | 13.0 | 91% |
| Lunda - Norte | Capenda-Camulemba | | | | 16.3 | 0.3 | 2% | 17.5 | 0.3 | 2% | 17.7 | 0.9 | 5% | 18.0 | 1.9 | 10% | 18.2 | 3.0 | 17% | 18.5 | 4.5 | 24% | 18.7 | 6.2 | 33% | 19.0 | 7.9 | 42% | 19.2 | 9.3 | 48% | 19.5 | 10.6 | 54% | 19.8 | 11.9 | 60% | 20.1 | 13.3 | 66% | 20.3 | 14.6 | 72% | 20.6 | 15.9 | 77% |
| Lunda - Norte | Caungula | | | | 8.3 | 0.0 | 0% | 8.9 | 0.0 | 0% | 9.0 | 0.3 | 4% | 9.1 | 0.8 | 9% | 9.3 | 1.4 | 15% | 9.4 | 2.2 | 23% | 9.5 | 3.1 | 32% | 9.7 | 3.9 | 41% | 9.8 | 4.6 | 47% | 9.9 | 5.3 | 53% | 10.1 | 6.0 | 60% | 10.2 | 6.7 | 65% | 10.3 | 7.4 | 71% | 10.5 | 8.0 | 77% |
| Lunda - Norte | Chitato | | | | 7.0 | 0.0 | 0% | 7.5 | 0.0 | 0% | 7.6 | 0.3 | 4% | 7.8 | 0.7 | 9% | 7.9 | 1.2 | 15% | 8.0 | 1.8 | 23% | 8.1 | 2.6 | 32% | 8.2 | 3.3 | 41% | 8.3 | 3.9 | 47% | 8.4 | 4.5 | 53% | 8.5 | 5.1 | 60% | 8.7 | 5.7 | 65% | 8.8 | 6.2 | 71% | 8.9 | 6.8 | 77% |
| Lunda - Norte | Cuango | | | | 115.6 | 7.6 | 7% | 123.9 | 7.6 | 6% | 125.6 | 11.9 | 9% | 127.4 | 18.3 | 14% | 129.2 | 26.3 | 20% | 131.0 | 36.5 | 28% | 132.8 | 48.2 | 36% | 134.7 | 59.9 | 44% | 136.6 | 69.0 | 51% | 138.5 | 78.1 | 56% | 140.4 | 87.1 | 62% | 142.4 | 96.2 | 68% | 144.4 | 105.3 | 73% | 146.4 | 114.4 | 78% |
| Lunda - Norte | Cuilo | | | | 6.0 | 0.0 | 0% | 6.4 | 0.0 | 0% | 6.5 | 0.2 | 4% | 6.6 | 0.6 | 9% | 6.7 | 1.0 | 15% | 6.8 | 1.6 | 23% | 6.9 | 2.2 | 32% | 7.0 | 2.9 | 41% | 7.1 | 3.4 | 47% | 7.2 | 3.9 | 53% | 7.3 | 4.3 | 60% | 7.4 | 4.8 | 65% | 7.5 | 5.3 | 71% | 7.6 | 5.8 | 77% |
| Lunda - Norte | Lubalo | | | | 10.7 | 0.0 | 0% | 11.5 | 0.0 | 0% | 11.7 | 0.4 | 4% | 11.8 | 1.0 | 9% | 12.0 | 1.8 | 15% | 12.2 | 2.8 | 23% | 12.3 | 4.0 | 32% | 12.5 | 5.1 | 41% | 12.7 | 6.0 | 47% | 12.9 | 6.9 | 53% | 13.1 | 7.8 | 60% | 13.2 | 8.7 | 65% | 13.4 | 9.5 | 71% | 13.6 | 10.4 | 77% |
| Lunda - Norte | Lucapa | | | | 28.1 | 9.1 | 32% | 30.1 | 9.1 | 30% | 30.6 | 10.0 | 33% | 31.0 | 11.2 | 36% | 31.4 | 12.8 | 41% | 31.9 | 14.7 | 46% | 32.3 | 17.0 | 53% | 32.8 | 19.3 | 59% | 33.2 | 21.0 | 63% | 33.7 | 22.8 | 68% | 34.2 | 24.6 | 72% | 34.6 | 26.3 | 76% | 35.1 | 28.1 | 80% | 35.6 | 29.8 | 84% |
| Lunda - Norte | Xá-muteba | | | | 30.2 | 0.0 | 0% | 32.4 | 0.0 | 0% | 32.8 | 1.2 | 4% | 33.3 | 2.9 | 9% | 33.7 | 5.1 | 15% | 34.2 | 7.9 | 23% | 34.7 | 11.1 | 32% | 35.2 | 14.4 | 41% | 35.7 | 16.9 | 47% | 36.2 | 19.3 | 53% | 36.7 | 21.8 | 60% | 37.2 | 24.3 | 65% | 37.7 | 26.8 | 71% | 38.2 | 29.3 | 77% |
| Lunda Sul | Cacolo | | | | 34.9 | 1.3 | 4% | 37.4 | 1.3 | 3% | 38.0 | 4.6 | 12% | 38.5 | 11.5 | 30% | 39.0 | 19.4 | 50% | 39.6 | 25.7 | 65% | 40.1 | 29.0 | 72% | 40.7 | 30.2 | 74% | 41.3 | 30.8 | 75% | 41.8 | 31.5 | 75% | 42.4 | 32.2 | 76% | 43.0 | 32.9 | 76% | 43.6 | 33.6 | 77% | 44.2 | 34.3 | 77% |
| Lunda Sul | Dala | | | | 36.8 | 0.5 | 1% | 39.4 | 0.5 | 1% | 40.0 | 4.1 | 10% | 40.5 | 11.5 | 28% | 41.1 | 20.0 | 49% | 41.7 | 26.7 | 64% | 42.3 | 30.2 | 71% | 42.9 | 31.5 | 73% | 43.5 | 32.2 | 74% | 44.1 | 32.9 | 75% | 44.7 | 33.7 | 75% | 45.3 | 34.4 | 76% | 45.9 | 35.1 | 76% | 46.6 | 35.9 | 77% |
| Lunda Sul | Muconda | | | | 55.4 | 2.4 | 4% | 59.3 | 2.4 | 4% | 60.2 | 7.6 | 13% | 61.0 | 18.5 | 30% | 61.9 | 31.0 | 50% | 62.7 | 40.9 | 65% | 63.6 | 46.1 | 72% | 64.5 | 47.9 | 74% | 65.4 | 49.0 | 75% | 66.3 | 50.1 | 76% | 67.2 | 51.2 | 76% | 68.2 | 52.3 | 77% | 69.1 | 53.3 | 77% | 70.1 | 54.4 | 78% |
| Lunda Sul | Saurimo | | | | 14.6 | 1.1 | 8% | 15.6 | 1.1 | 7% | 15.8 | 2.4 | 15% | 16.0 | 5.2 | 33% | 16.3 | 8.4 | 52% | 16.5 | 11.0 | 67% | 16.7 | 12.3 | 74% | 17.0 | 12.8 | 75% | 17.2 | 13.0 | 76% | 17.4 | 13.3 | 76% | 17.7 | 13.6 | 77% | 17.9 | 13.9 | 77% | 18.2 | 14.2 | 78% | 18.4 | 14.4 | 78% |
| Malanje | Caculama | | | | 16.9 | 0.0 | 0% | 18.1 | 0.0 | 0% | 18.4 | 0.7 | 4% | 18.6 | 1.6 | 9% | 18.9 | 2.9 | 15% | 19.1 | 4.4 | 23% | 19.4 | 6.2 | 32% | 19.7 | 8.0 | 41% | 20.0 | 9.4 | 47% | 20.2 | 10.8 | 53% | 20.5 | 12.2 | 60% | 20.8 | 13.6 | 65% | 21.1 | 15.0 | 71% | 21.4 | 16.4 | 77% |
| Malanje | Cacuso | | | | 38.0 | 8.3 | 22% | 40.7 | 8.3 | 20% | 41.3 | 9.6 | 23% | 41.9 | 11.4 | 27% | 42.5 | 13.7 | 32% | 43.1 | 16.7 | 39% | 43.7 | 20.1 | 46% | 44.3 | 23.5 | 53% | 44.9 | 26.1 | 58% | 45.5 | 28.7 | 63% | 46.2 | 31.3 | 68% | 46.8 | 34.0 | 73% | 47.5 | 36.6 | 77% | 48.1 | 39.2 | 81% |
| Malanje | Cagandala | | | | 22.1 | 0.0 | 0% | 23.7 | 0.0 | 0% | 24.0 | 0.9 | 4% | 24.4 | 2.1 | 9% | 24.7 | 3.8 | 15% | 25.1 | 5.8 | 23% | 25.4 | 8.2 | 32% | 25.8 | 10.5 | 41% | 26.1 | 12.3 | 47% | 26.5 | 14.2 | 53% | 26.9 | 16.0 | 60% | 27.2 | 17.8 | 65% | 27.6 | 19.6 | 71% | 28.0 | 21.5 | 77% |
| Malanje | Calandula | | | | 31.8 | 6.7 | 21% | 34.1 | 6.7 | 20% | 34.6 | 7.7 | 22% | 35.0 | 9.3 | 26% | 35.5 | 11.2 | 32% | 36.0 | 13.7 | 38% | 36.5 | 16.6 | 45% | 37.0 | 19.4 | 52% | 37.6 | 21.6 | 58% | 38.1 | 23.9 | 63% | 38.6 | 26.1 | 68% | 39.2 | 28.3 | 72% | 39.7 | 30.5 | 77% | 40.3 | 32.7 | 81% |
| Malanje | Cambundi-Catembo | | | | 17.9 | 0.5 | 3% | 19.2 | 0.5 | 3% | 19.5 | 1.2 | 6% | 19.8 | 2.2 | 11% | 20.0 | 3.5 | 18% | 20.3 | 5.1 | 25% | 20.6 | 7.0 | 34% | 20.9 | 8.9 | 43% | 21.2 | 10.3 | 49% | 21.5 | 11.8 | 55% | 21.8 | 13.2 | 61% | 22.1 | 14.7 | 66% | 22.4 | 16.1 | 72% | 22.7 | 17.6 | 77% |
| Malanje | Kahombo | | | | 17.2 | 0.0 | 0% | 18.5 | 0.0 | 0% | 18.7 | 0.7 | 4% | 19.0 | 1.7 | 9% | 19.3 | 2.9 | 15% | 19.5 | 4.5 | 23% | 19.8 | 6.4 | 32% | 20.1 | 8.2 | 41% | 20.4 | 9.6 | 47% | 20.7 | 11.1 | 53% | 21.0 | 12.5 | 60% | 21.2 | 13.9 | 65% | 21.5 | 15.3 | 71% | 21.8 | 16.7 | 77% |
| Malanje | Kiwaba-Ngozi | | | | 10.2 | 1.4 | 13% | 10.9 | 1.4 | 13% | 11.0 | 1.7 | 16% | 11.2 | 2.3 | 20% | 11.4 | 2.9 | 26% | 11.5 | 3.8 | 33% | 11.7 | 4.7 | 41% | 11.8 | 5.7 | 48% | 12.0 | 6.5 | 54% | 12.2 | 7.2 | 59% | 12.3 | 8.0 | 65% | 12.5 | 8.7 | 70% | 12.7 | 9.5 | 75% | 12.9 | 10.2 | 80% |
| Malanje | Kunda-Dia-Baze | | | | 11.6 | 0.0 | 0% | 12.4 | 0.0 | 0% | 12.6 | 0.4 | 4% | 12.8 | 1.1 | 9% | 12.9 | 2.0 | 15% | 13.1 | 3.0 | 23% | 13.3 | 4.3 | 32% | 13.5 | 5.5 | 41% | 13.7 | 6.5 | 47% | 13.9 | 7.4 | 53% | 14.1 | 8.4 | 60% | 14.3 | 9.3 | 65% | 14.5 | 10.3 | 71% | 14.7 | 11.2 | 77% |
| Malanje | Luquembo | | | | 23.9 | 0.0 | 0% | 25.6 | 0.0 | 0% | 25.9 | 0.9 | 4% | 26.3 | 2.3 | 9% | 26.7 | 4.1 | 15% | 27.0 | 6.3 | 23% | 27.4 | 8.8 | 32% | 27.8 | 11.4 | 41% | 28.2 | 13.3 | 47% | 28.6 | 15.3 | 53% | 29.0 | 17.3 | 60% | 29.4 | 19.2 | 65% | 29.8 | 21.2 | 71% | 30.2 | 23.2 | 77% |
| Malanje | Malanje | | | | 18.2 | 6.9 | 38% | 19.5 | 6.9 | 36% | 19.7 | 7.4 | 38% | 20.0 | 8.2 | 41% | 20.3 | 9.1 | 45% | 20.6 | 10.3 | 50% | 20.9 | 11.7 | 56% | 21.2 | 13.1 | 62% | 21.4 | 14.2 | 66% | 21.7 | 15.2 | 70% | 22.1 | 16.3 | 74% | 22.4 | 17.4 | 78% | 22.7 | 18.5 | 81% | 23.0 | 19.5 | 85% |
| Malanje | Marimba | | | | 9.0 | 0.0 | 0% | 9.6 | 0.0 | 0% | 9.8 | 0.3 | 4% | 9.9 | 0.9 | 9% | 10.1 | 1.5 | 15% | 10.2 | 2.4 | 23% | 10.3 | 3.3 | 32% | 10.5 | 4.3 | 41% | 10.6 | 5.0 | 47% | 10.8 | 5.8 | 53% | 10.9 | 6.5 | 60% | 11.1 | 7.2 | 65% | 11.2 | 8.0 | 71% | 11.4 | 8.7 | 77% |
| Malanje | Massango | | | | 13.9 | 0.0 | 0% | 14.9 | 0.0 | 0% | 15.1 | 0.5 | 4% | 15.3 | 1.3 | 9% | 15.5 | 2.4 | 15% | 15.7 | 3.6 | 23% | 15.9 | 5.1 | 32% | 16.2 | 6.6 | 41% | 16.4 | 7.7 | 47% | 16.6 | 8.9 | 53% | 16.9 | 10.0 | 60% | 17.1 | 11.2 | 65% | 17.3 | 12.3 | 71% | 17.6 | 13.5 | 77% |
| Malanje | Quela | | | | 19.0 | 0.2 | 1% | 20.3 | 0.2 | 1% | 20.6 | 0.9 | 4% | 20.9 | 2.0 | 10% | 21.2 | 3.4 | 16% | 21.5 | 5.1 | 24% | 21.8 | 7.1 | 33% | 22.1 | 9.1 | 41% | 22.4 | 10.7 | 48% | 22.7 | 12.2 | 54% | 23.1 | 13.8 | 60% | 23.4 | 15.4 | 66% | 23.7 | 16.9 | 71% | 24.0 | 18.5 | 77% |
| Malanje | Quirima | | | | 10.3 | 0.0 | 0% | 11.0 | 0.0 | 0% | 11.2 | 0.4 | 4% | 11.4 | 1.0 | 9% | 11.5 | 1.8 | 15% | 11.7 | 2.7 | 23% | 11.8 | 3.8 | 32% | 12.0 | 4.9 | 41% | 12.2 | 5.8 | 47% | 12.3 | 6.6 | 53% | 12.5 | 7.5 | 60% | 12.7 | 8.3 | 65% | 12.9 | 9.2 | 71% | 13.0 | 10.0 | 77% |
| Moxico | Alto Zambeze | | | | 23.6 | 0.4 | 2% | 25.3 | 0.4 | 2% | 25.6 | 1.3 | 5% | 26.0 | 2.7 | 10% | 26.3 | 4.4 | 17% | 26.7 | 6.5 | 24% | 27.1 | 9.0 | 33% | 27.5 | 11.5 | 42% | 27.8 | 13.4 | 48% | 28.2 | 15.3 | 54% | 28.6 | 17.2 | 60% | 29.0 | 19.2 | 66% | 29.4 | 21.1 | 72% | 29.8 | 23.0 | 77% |
| Moxico | Léua | | | | 9.9 | 4.7 | 48% | 10.6 | 4.7 | 44% | 10.7 | 4.9 | 46% | 10.9 | 5.3 | 49% | 11.0 | 5.8 | 52% | 11.2 | 6.4 | 57% | 11.3 | 7.0 | 62% | 11.5 | 7.7 | 67% | 11.6 | 8.2 | 71% | 11.8 | 8.8 | 74% | 12.0 | 9.3 | 78% | 12.1 | 9.8 | 81% | 12.3 | 10.3 | 84% | 12.5 | 10.9 | 87% |
| Moxico | Luacano | | | | 7.5 | 5.8 | 77% | 8.1 | 5.8 | 72% | 8.2 | 5.9 | 72% | 8.3 | 6.1 | 73% | 8.4 | 6.3 | 75% | 8.5 | 6.6 | 78% | 8.7 | 7.0 | 80% | 8.8 | 7.3 | 83% | 8.9 | 7.6 | 85% | 9.0 | 7.9 | 87% | 9.2 | 8.1 | 89% | 9.3 | 8.4 | 90% | 9.4 | 8.7 | 92% | 9.6 | 8.9 | 93% |
| Moxico | Luchazes | | | | 19.2 | 1.6 | 8% | 20.6 | 1.6 | 8% | 20.9 | 2.3 | 11% | 21.2 | 3.3 | 16% | 21.5 | 4.7 | 22% | 21.8 | 6.3 | 29% | 22.1 | 8.2 | 37% | 22.4 | 10.2 | 45% | 22.7 | 11.7 | 51% | 23.0 | 13.2 | 57% | 23.4 | 14.6 | 63% | 23.7 | 16.1 | 68% | 24.0 | 17.6 | 73% | 24.4 | 19.1 | 78% |
| Moxico | Lumbala-Nguimbo | | | | 12.0 | 3.1 | 26% | 12.8 | 3.1 | 24% | 13.0 | 3.5 | 27% | 13.2 | 4.0 | 30% | 13.4 | 4.7 | 35% | 13.6 | 5.6 | 41% | 13.8 | 6.7 | 48% | 14.0 | 7.7 | 55% | 14.2 | 8.5 | 60% | 14.4 | 9.3 | 65% | 14.6 | 10.1 | 69% | 14.8 | 10.9 | 74% | 15.0 | 11.7 | 78% | 15.2 | 12.5 | 82% |
| Moxico | Moxico | | | | 19.1 | 10.3 | 54% | 20.5 | 10.3 | 50% | 20.8 | 10.7 | 51% | 21.1 | 11.4 | 54% | 21.4 | 12.2 | 57% | 21.7 | 13.3 | 61% | 22.0 | 14.5 | 66% | 22.3 | 15.7 | 70% | 22.6 | 16.7 | 74% | 22.9 | 17.6 | 77% | 23.3 | 18.6 | 80% | 23.6 | 19.5 | 83% | 23.9 | 20.5 | 86% | 24.2 | 21.4 | 88% |
| Namibe | Bibala | | | | 14.4 | 5.8 | 41% | 15.4 | 5.8 | 38% | 15.6 | 6.2 | 40% | 15.8 | 6.8 | 43% | 16.1 | 7.5 | 47% | 16.3 | 8.5 | 52% | 16.5 | 9.5 | 58% | 16.7 | 10.6 | 63% | 17.0 | 11.4 | 67% | 17.2 | 12.3 | 71% | 17.5 | 13.1 | 75% | 17.7 | 13.9 | 79% | 17.9 | 14.7 | 82% | 18.2 | 15.6 | 85% |
| Namibe | Camucuio | | | | 4.8 | 2.8 | 58% | 5.1 | 2.8 | 55% | 5.2 | 2.9 | 56% | 5.2 | 3.0 | 58% | 5.3 | 3.2 | 61% | 5.4 | 3.5 | 65% | 5.5 | 3.8 | 69% | 5.5 | 4.1 | 73% | 5.6 | 4.3 | 76% | 5.7 | 4.5 | 79% | 5.8 | 4.7 | 82% | 5.9 | 4.9 | 84% | 5.9 | 5.2 | 87% | 6.0 | 5.4 | 89% |
| Namibe | Namibe | | | | 11.6 | 7.1 | 61% | 12.4 | 7.1 | 57% | 12.6 | 7.4 | 58% | 12.8 | 7.7 | 60% | 13.0 | 8.2 | 63% | 13.2 | 8.8 | 67% | 13.3 | 9.4 | 71% | 13.5 | 10.1 | 75% | 13.7 | 10.6 | 78% | 13.9 | 11.2 | 80% | 14.1 | 11.7 | 83% | 14.3 | 12.2 | 85% | 14.5 | 12.7 | 88% | 14.7 | 13.2 | 90% |
| Namibe | Tômbua | | | | 0.0 | 0.0 | 0% | 0.0 | 0.0 | 0% | 0.0 | 0.0 | 4% | 0.0 | 0.0 | 9% | 0.0 | 0.0 | 15% | 0.0 | 0.0 | 23% | 0.0 | 0.0 | 32% | 0.0 | 0.0 | 41% | 0.0 | 0.0 | 47% | 0.0 | 0.0 | 53% | 0.0 | 0.0 | 60% | 0.0 | 0.0 | 65% | 0.0 | 0.0 | 71% | 0.0 | 0.0 | 77% |
| Namibe | Virei | | | | 14.6 | 1.4 | 10% | 15.7 | 1.4 | 9% | 15.9 | 1.9 | 12% | 16.1 | 2.7 | 17% | 16.4 | 3.7 | 23% | 16.6 | 5.0 | 30% | 16.8 | 6.4 | 38% | 17.1 | 7.9 | 46% | 17.3 | 9.0 | 52% | 17.5 | 10.1 | 58% | 17.8 | 11.2 | 63% | 18.0 | 12.4 | 69% | 18.3 | 13.5 | 74% | 18.5 | 14.6 | 79% |
| Uíge | Ambuíla | | | | 2.5 | 0.0 | 0% | 2.6 | 0.0 | 0% | 2.7 | 0.2 | 9% | 2.7 | 0.7 | 27% | 2.8 | 1.3 | 48% | 2.8 | 1.8 | 63% | 2.8 | 2.0 | 71% | 2.9 | 2.1 | 73% | 2.9 | 2.1 | 74% | 3.0 | 2.2 | 74% | 3.0 | 2.2 | 75% | 3.0 | 2.3 | 76% | 3.1 | 2.3 | 76% | 3.1 | 2.4 | 77% |
| Uíge | Bembe | | | | 12.3 | 4.2 | 34% | 13.2 | 4.2 | 31% | 13.4 | 5.1 | 38% | 13.6 | 6.9 | 51% | 13.8 | 9.1 | 66% | 14.0 | 10.8 | 77% | 14.2 | 11.7 | 82% | 14.4 | 12.0 | 83% | 14.6 | 12.2 | 84% | 14.8 | 12.4 | 84% | 15.0 | 12.6 | 84% | 15.2 | 12.8 | 84% | 15.4 | 12.9 | 84% | 15.6 | 13.1 | 84% |
| Uíge | Damba | | | | 36.3 | 3.3 | 9% | 38.9 | 3.3 | 8% | 39.5 | 6.6 | 17% | 40.0 | 13.5 | 34% | 40.6 | 21.4 | 53% | 41.2 | 27.6 | 67% | 41.7 | 30.9 | 74% | 42.3 | 32.1 | 76% | 42.9 | 32.8 | 76% | 43.5 | 33.4 | 77% | 44.1 | 34.1 | 77% | 44.7 | 34.8 | 78% | 45.4 | 35.5 | 78% | 46.0 | 36.2 | 79% |
| Uíge | Kangola | | | | 56.6 | 7.1 | 12% | 60.6 | 7.1 | 12% | 61.5 | 12.0 | 20% | 62.4 | 22.5 | 36% | 63.2 | 34.5 | 54% | 64.1 | 43.9 | 69% | 65.0 | 48.9 | 75% | 65.9 | 50.7 | 77% | 66.8 | 51.7 | 77% | 67.8 | 52.7 | 78% | 68.7 | 53.8 | 78% | 69.7 | 54.8 | 79% | 70.7 | 55.8 | 79% | 71.7 | 56.9 | 79% |
| Uíge | Maquela do Zombo | | | | 2.6 | 0.0 | 0% | 2.8 | 0.0 | 0% | 2.8 | 0.3 | 9% | 2.9 | 0.8 | 27% | 2.9 | 1.4 | 48% | 3.0 | 1.9 | 63% | 3.0 | 2.1 | 71% | 3.0 | 2.2 | 73% | 3.1 | 2.3 | 74% | 3.1 | 2.3 | 74% | 3.2 | 2.4 | 75% | 3.2 | 2.4 | 76% | 3.3 | 2.5 | 76% | 3.3 | 2.5 | 77% |
| Uíge | Milunga | | | | 4.9 | 2.0 | 41% | 5.2 | 2.0 | 38% | 5.3 | 2.3 | 44% | 5.4 | 3.0 | 56% | 5.5 | 3.8 | 70% | 5.5 | 4.4 | 80% | 5.6 | 4.8 | 85% | 5.7 | 4.9 | 86% | 5.8 | 5.0 | 86% | 5.9 | 5.0 | 86% | 5.9 | 5.1 | 86% | 6.0 | 5.2 | 86% | 6.1 | 5.2 | 86% | 6.2 | 5.3 | 86% |
| Uíge | Mucaba | | | | 45.8 | 2.5 | 5% | 49.1 | 2.5 | 5% | 49.8 | 6.8 | 14% | 50.5 | 15.7 | 31% | 51.2 | 26.0 | 51% | 51.9 | 34.1 | 66% | 52.6 | 38.3 | 73% | 53.4 | 39.8 | 75% | 54.1 | 40.7 | 75% | 54.9 | 41.6 | 76% | 55.6 | 42.5 | 76% | 56.4 | 43.4 | 77% | 57.2 | 44.3 | 77% | 58.0 | 45.2 | 78% |
| Uíge | Negage | | | | 14.4 | 1.0 | 7% | 15.5 | 1.0 | 6% | 15.7 | 2.3 | 15% | 15.9 | 5.1 | 32% | 16.1 | 8.3 | 52% | 16.3 | 10.8 | 66% | 16.6 | 12.2 | 73% | 16.8 | 12.6 | 75% | 17.0 | 12.9 | 76% | 17.3 | 13.2 | 76% | 17.5 | 13.4 | 77% | 17.8 | 13.7 | 77% | 18.0 | 14.0 | 78% | 18.3 | 14.3 | 78% |
| Uíge | Nova Esperança | | | | 12.1 | 0.0 | 0% | 13.0 | 0.0 | 0% | 13.2 | 1.2 | 9% | 13.4 | 3.7 | 27% | 13.6 | 6.5 | 48% | 13.7 | 8.7 | 63% | 13.9 | 9.9 | 71% | 14.1 | 10.3 | 73% | 14.3 | 10.6 | 74% | 14.5 | 10.8 | 74% | 14.7 | 11.0 | 75% | 14.9 | 11.3 | 76% | 15.2 | 11.5 | 76% | 15.4 | 11.8 | 77% |
| Uíge | Quimbele | | | | 25.0 | 0.0 | 0% | 26.7 | 0.0 | 0% | 27.1 | 2.4 | 9% | 27.5 | 7.5 | 27% | 27.9 | 13.3 | 48% | 28.3 | 17.9 | 63% | 28.7 | 20.4 | 71% | 29.1 | 21.2 | 73% | 29.5 | 21.7 | 74% | 29.9 | 22.2 | 74% | 30.3 | 22.7 | 75% | 30.7 | 23.2 | 76% | 31.2 | 23.7 | 76% | 31.6 | 24.2 | 77% |
| Uíge | Quitexe | | | | 16.0 | 2.0 | 12% | 17.1 | 2.0 | 12% | 17.4 | 3.4 | 19% | 17.6 | 6.3 | 36% | 17.9 | 9.7 | 54% | 18.1 | 12.4 | 68% | 18.4 | 13.8 | 75% | 18.6 | 14.3 | 77% | 18.9 | 14.6 | 77% | 19.2 | 14.9 | 78% | 19.4 | 15.2 | 78% | 19.7 | 15.5 | 79% | 20.0 | 15.8 | 79% | 20.3 | 16.1 | 79% |
| Uíge | Sanza Pombo | | | | 20.0 | 4.9 | 24% | 21.5 | 4.9 | 23% | 21.8 | 6.5 | 30% | 22.1 | 9.8 | 45% | 22.4 | 13.6 | 61% | 22.7 | 16.7 | 73% | 23.0 | 18.2 | 79% | 23.3 | 18.8 | 81% | 23.6 | 19.1 | 81% | 24.0 | 19.5 | 81% | 24.3 | 19.8 | 81% | 24.7 | 20.1 | 82% | 25.0 | 20.5 | 82% | 25.3 | 20.8 | 82% |
| Uíge | Songo | | | | 4.4 | 3.2 | 73% | 4.7 | 3.2 | 68% | 4.8 | 3.4 | 71% | 4.8 | 3.8 | 79% | 4.9 | 4.3 | 87% | 5.0 | 4.6 | 93% | 5.0 | 4.8 | 96% | 5.1 | 4.9 | 96% | 5.2 | 4.9 | 95% | 5.2 | 5.0 | 95% | 5.3 | 5.0 | 94% | 5.4 | 5.0 | 94% | 5.5 | 5.1 | 93% | 5.5 | 5.1 | 93% |
| Zaire | Cuimba | | | | 13.2 | 0.0 | 0% | 14.2 | 0.0 | 0% | 14.4 | 0.5 | 4% | 14.6 | 1.3 | 9% | 14.8 | 2.3 | 15% | 15.0 | 3.5 | 23% | 15.2 | 4.9 | 32% | 15.4 | 6.3 | 41% | 15.6 | 7.4 | 47% | 15.9 | 8.5 | 53% | 16.1 | 9.6 | 60% | 16.3 | 10.7 | 65% | 16.5 | 11.8 | 71% | 16.8 | 12.9 | 77% |
| Zaire | Mbanza Congo | | | | 13.8 | 0.7 | 5% | 14.8 | 0.7 | 5% | 15.0 | 1.2 | 8% | 15.2 | 2.0 | 13% | 15.4 | 3.0 | 19% | 15.6 | 4.2 | 27% | 15.8 | 5.6 | 35% | 16.0 | 7.0 | 44% | 16.3 | 8.1 | 50% | 16.5 | 9.2 | 56% | 16.7 | 10.3 | 62% | 17.0 | 11.4 | 67% | 17.2 | 12.5 | 73% | 17.4 | 13.6 | 78% |
| Zaire | Nóqui | | | | 12.2 | 0.0 | 0% | 13.1 | 0.0 | 0% | 13.2 | 0.5 | 4% | 13.4 | 1.2 | 9% | 13.6 | 2.1 | 15% | 13.8 | 3.2 | 23% | 14.0 | 4.5 | 32% | 14.2 | 5.8 | 41% | 14.4 | 6.8 | 47% | 14.6 | 7.8 | 53% | 14.8 | 8.8 | 60% | 15.0 | 9.8 | 65% | 15.2 | 10.8 | 71% | 15.4 | 11.8 | 77% |
| Zaire | Nzeto | | | | 11.3 | 0.0 | 0% | 12.1 | 0.0 | 0% | 12.3 | 0.4 | 4% | 12.4 | 1.1 | 9% | 12.6 | 1.9 | 15% | 12.8 | 3.0 | 23% | 13.0 | 4.2 | 32% | 13.1 | 5.4 | 41% | 13.3 | 6.3 | 47% | 13.5 | 7.2 | 54% | 13.7 | 8.2 | 60% | 13.9 | 9.1 | 65% | 14.1 | 10.0 | 71% | 14.3 | 11.0 | 77% |
| Zaire | Soyo | | | | 22.7 | 4.0 | 18% | 24.4 | 4.0 | 16% | 24.7 | 4.8 | 19% | 25.0 | 5.9 | 24% | 25.4 | 7.4 | 29% | 25.7 | 9.2 | 36% | 26.1 | 11.3 | 43% | 26.5 | 13.4 | 51% | 26.8 | 15.0 | 56% | 27.2 | 16.6 | 61% | 27.6 | 18.3 | 66% | 28.0 | 19.9 | 71% | 28.4 | 21.5 | 76% | 28.8 | 23.2 | 81% |
| Zaire | Tomboco | | | | 11.8 | 0.0 | 0% | 12.7 | 0.0 | 0% | 12.9 | 0.5 | 4% | 13.0 | 1.1 | 9% | 13.2 | 2.0 | 15% | 13.4 | 3.1 | 23% | 13.6 | 4.4 | 32% | 13.8 | 5.6 | 41% | 14.0 | 6.6 | 47% | 14.2 | 7.6 | 53% | 14.4 | 8.6 | 60% | 14.6 | 9.5 | 65% | 14.8 | 10.5 | 71% | 15.0 | 11.5 | 77% |
| **TOTAL** | **152 Mun.** | **372** | **372 Comunas** | | **4,205** | **643** | **15%** | **4,507** | **643** | **14%** | **4,570** | **827** | **18%** | **4,634** | **1,144** | **25%** | **4,699** | **1,524** | **32%** | **4,765** | **1,931** | **41%** | **4,832** | **2,322** | **48%** | **4,899** | **2,670** | **54%** | **4,968** | **2,935** | **59%** | **5,038** | **3,200** | **64%** | **5,108** | **3,465** | **68%** | **5,180** | **3,730** | **72%** | **5,252** | **3,995** | **76%** | **5,326** | **4,261** | **80%** |

**ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026**

| PROV. | MUN. | COMUNA | POP. RATE (%) | 2009 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) | POP. EST. (x1000) | TOTAL ACCESS NO. (x1000) | TOTAL ACCESS RATE (%) |
| **PROJECTION BY PROVINCE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | 8 | 21 | | 116.0 | 25.1 | 22% | 124.4 | 25.1 | 20% | 126.1 | 28.9 | 23% | 127.9 | 34.5 | 27% | 129.7 | 41.6 | 32% | 131.5 | 50.6 | 38% | 133.3 | 61.0 | 46% | 135.2 | 71.4 | 53% | 137.1 | 79.4 | 58% | 139.0 | 87.5 | 63% | 141.0 | 95.5 | 68% | 142.9 | 103.5 | 72% | 144.9 | 111.6 | 77% | 147.0 | 119.6 | 81% |
| Benguela | 8 | 21 | | 307.3 | 93.0 | 30% | 329.4 | 93.0 | 28% | 334.0 | 102.3 | 31% | 338.7 | 116.1 | 34% | 343.4 | 133.4 | 39% | 348.2 | 155.4 | 45% | 353.1 | 180.8 | 51% | 358.0 | 206.2 | 58% | 363.0 | 225.8 | 62% | 368.1 | 245.5 | 67% | 373.3 | 265.1 | 71% | 378.5 | 284.8 | 75% | 383.8 | 304.4 | 79% | 389.2 | 324.0 | 83% |
| Bié | 9 | 29 | | 425.7 | 56.2 | 13% | 456.3 | 56.2 | 12% | 462.7 | 71.1 | 15% | 469.2 | 93.5 | 20% | 475.7 | 121.4 | 26% | 482.4 | 156.8 | 33% | 489.2 | 197.8 | 40% | 496.0 | 238.8 | 48% | 503.0 | 270.5 | 54% | 510.0 | 302.2 | 59% | 517.1 | 333.8 | 65% | 524.4 | 365.5 | 70% | 531.7 | 397.2 | 75% | 539.2 | 428.9 | 80% |
| Cabinda | 4 | 7 | | 64.0 | 7.3 | 11% | 68.6 | 7.3 | 11% | 69.6 | 9.5 | 14% | 70.6 | 13.0 | 18% | 71.6 | 17.2 | 24% | 72.6 | 22.6 | 31% | 73.6 | 28.9 | 39% | 74.6 | 35.2 | 47% | 75.7 | 40.0 | 53% | 76.7 | 44.8 | 58% | 77.8 | 49.7 | 64% | 78.9 | 54.5 | 69% | 80.0 | 59.3 | 74% | 81.1 | 64.2 | 79% |
| Cunene | 6 | 14 | | 273.8 | 27.7 | 10% | 293.5 | 27.7 | 9% | 297.6 | 37.5 | 13% | 301.8 | 52.2 | 17% | 306.0 | 70.7 | 23% | 310.3 | 94.0 | 30% | 314.6 | 121.1 | 38% | 319.0 | 148.1 | 46% | 323.5 | 169.0 | 52% | 328.0 | 189.9 | 58% | 332.6 | 210.8 | 63% | 337.3 | 231.7 | 69% | 342.0 | 252.6 | 74% | 346.8 | 273.5 | 79% |
| Huambo (2) | 11 | 25 | | 375.3 | 83.8 | 22% | 402.3 | 83.8 | 21% | 408.0 | 114.2 | 28% | 413.7 | 178.0 | 43% | 419.5 | 250.9 | 60% | 425.4 | 308.6 | 73% | 431.3 | 339.0 | 79% | 437.4 | 349.6 | 80% | 443.5 | 355.9 | 80% | 449.7 | 362.3 | 81% | 456.0 | 368.6 | 81% | 462.4 | 374.9 | 81% | 468.8 | 381.3 | 81% | 475.4 | 387.6 | 82% |
| Huila | 14 | 45 | | 651.8 | 157.5 | 24% | 698.7 | 157.5 | 23% | 708.5 | 178.3 | 25% | 718.4 | 209.4 | 29% | 728.5 | 248.3 | 34% | 738.7 | 297.6 | 40% | 749.0 | 354.7 | 47% | 759.5 | 411.8 | 54% | 770.2 | 455.9 | 59% | 780.9 | 500.0 | 64% | 791.9 | 544.1 | 69% | 803.0 | 588.2 | 73% | 814.2 | 632.3 | 78% | 825.6 | 676.4 | 82% |
| Kuando Kuba | 9 | 21 | | 70.2 | 7.4 | 11% | 75.3 | 7.4 | 10% | 76.3 | 10.0 | 13% | 77.4 | 13.7 | 18% | 78.5 | 18.4 | 23% | 79.6 | 24.4 | 31% | 80.7 | 31.3 | 39% | 81.8 | 38.2 | 47% | 82.9 | 43.5 | 52% | 84.1 | 48.9 | 58% | 85.3 | 54.2 | 64% | 86.5 | 59.5 | 69% | 87.7 | 64.9 | 74% | 88.9 | 70.2 | 79% |
| Kuanza Norte | 9 | 18 | | 82.1 | 14.5 | 18% | 88.0 | 14.5 | 16% | 89.3 | 17.2 | 19% | 90.5 | 21.4 | 24% | 91.8 | 26.6 | 29% | 93.1 | 33.2 | 36% | 94.4 | 40.8 | 43% | 95.7 | 48.4 | 51% | 97.0 | 54.3 | 56% | 98.4 | 60.2 | 61% | 99.8 | 66.1 | 66% | 101.2 | 72.0 | 71% | 102.6 | 77.9 | 76% | 104.0 | 83.7 | 81% |
| Kuanza Sul | 12 | 23 | | 340.0 | 30.9 | 9% | 364.4 | 30.9 | 8% | 369.5 | 43.2 | 12% | 374.7 | 61.7 | 16% | 380.0 | 84.8 | 22% | 385.3 | 114.0 | 30% | 390.7 | 147.9 | 38% | 396.1 | 181.7 | 46% | 401.7 | 207.9 | 52% | 407.3 | 234.0 | 57% | 413.0 | 260.2 | 63% | 418.8 | 286.4 | 68% | 424.7 | 312.5 | 74% | 430.6 | 338.7 | 79% |
| Luanda | 5 | 6 | | 388.8 | 8.1 | 2% | 416.8 | 8.1 | 2% | 422.6 | 23.0 | 5% | 428.5 | 45.3 | 11% | 434.5 | 73.2 | 17% | 440.6 | 108.5 | 25% | 446.8 | 149.4 | 33% | 453.0 | 190.3 | 42% | 459.4 | 221.9 | 48% | 465.8 | 253.4 | 54% | 472.3 | 285.0 | 60% | 478.9 | 316.6 | 66% | 485.6 | 348.2 | 72% | 492.4 | 379.8 | 77% |
| Lunda Norte | 9 | 16 | | 233.6 | 24.5 | 10% | 250.4 | 24.5 | 10% | 253.9 | 32.8 | 13% | 257.4 | 45.4 | 18% | 261.1 | 61.1 | 23% | 264.7 | 80.9 | 31% | 268.4 | 103.9 | 39% | 272.2 | 126.9 | 47% | 276.0 | 144.7 | 52% | 279.8 | 162.5 | 58% | 283.8 | 180.3 | 64% | 287.7 | 198.0 | 69% | 291.8 | 215.8 | 74% | 295.8 | 233.6 | 79% |
| Lunda Sul (2 | 4 | 10 | | 141.6 | 5.4 | 4% | 151.8 | 5.4 | 4% | 153.9 | 18.7 | 12% | 156.1 | 46.8 | 30% | 158.3 | 78.9 | 50% | 160.5 | 104.3 | 65% | 162.7 | 117.6 | 72% | 165.0 | 122.3 | 74% | 167.3 | 125.1 | 75% | 169.7 | 127.9 | 75% | 172.0 | 130.6 | 76% | 174.5 | 133.4 | 76% | 176.9 | 136.2 | 77% | 179.4 | 139.0 | 77% |
| Malanje | 14 | 37 | | 259.9 | 24.0 | 9% | 278.6 | 24.0 | 9% | 282.5 | 33.4 | 12% | 286.4 | 47.5 | 17% | 290.4 | 65.1 | 22% | 294.5 | 87.4 | 30% | 298.6 | 113.3 | 38% | 302.8 | 139.1 | 46% | 307.1 | 159.1 | 52% | 311.4 | 179.1 | 58% | 315.7 | 199.1 | 63% | 320.1 | 219.0 | 68% | 324.6 | 239.0 | 74% | 329.2 | 259.0 | 79% |
| Moxico | 6 | 20 | | 91.3 | 25.8 | 28% | 97.9 | 25.8 | 26% | 99.3 | 28.6 | 29% | 100.6 | 32.8 | 33% | 102.1 | 38.0 | 37% | 103.5 | 44.7 | 43% | 104.9 | 52.4 | 50% | 106.4 | 60.1 | 56% | 107.9 | 66.0 | 61% | 109.4 | 72.0 | 66% | 110.9 | 77.9 | 70% | 112.5 | 83.9 | 75% | 114.1 | 89.8 | 79% | 115.7 | 95.8 | 83% |
| Namibe | 5 | 9 | | 45.4 | 17.1 | 38% | 48.7 | 17.1 | 35% | 49.3 | 18.4 | 37% | 50.0 | 20.3 | 41% | 50.7 | 22.7 | 45% | 51.4 | 25.7 | 50% | 52.2 | 29.2 | 56% | 52.9 | 32.6 | 62% | 53.6 | 35.3 | 66% | 54.4 | 38.0 | 70% | 55.1 | 40.7 | 74% | 55.9 | 43.4 | 78% | 56.7 | 46.1 | 81% | 57.5 | 48.8 | 85% |
| Uige (2) | 13 | 31 | | 252.9 | 30.1 | 12% | 271.1 | 30.1 | 11% | 274.9 | 52.5 | 19% | 278.7 | 99.5 | 36% | 282.6 | 153.2 | 54% | 286.6 | 195.7 | 68% | 290.6 | 218.1 | 75% | 294.7 | 225.9 | 77% | 298.8 | 230.6 | 77% | 303.0 | 235.2 | 78% | 307.2 | 239.9 | 78% | 311.5 | 244.5 | 79% | 315.9 | 249.2 | 79% | 320.3 | 253.9 | 79% |
| Zaire | 6 | 19 | | 85.0 | 4.7 | 6% | 91.1 | 4.7 | 5% | 92.4 | 7.9 | 9% | 93.7 | 12.6 | 13% | 95.0 | 18.6 | 20% | 96.3 | 26.1 | 27% | 97.7 | 34.8 | 36% | 99.1 | 43.5 | 44% | 100.4 | 50.2 | 50% | 101.8 | 57.0 | 56% | 103.3 | 63.7 | 62% | 104.7 | 70.4 | 67% | 106.2 | 77.1 | 73% | 107.7 | 83.9 | 78% |
| **TOTAL** | **152** | **372** | | **4,205** | **643** | **15%** | **4,507** | **643** | **14%** | **4,570** | **827** | **18%** | **4,634** | **1,144** | **25%** | **4,699** | **1,524** | **32%** | **4,765** | **1,931** | **41%** | **4,832** | **2,322** | **48%** | **4,899** | **2,670** | **54%** | **4,968** | **2,935** | **59%** | **5,038** | **3,200** | **64%** | **5,108** | **3,465** | **68%** | **5,180** | **3,730** | **72%** | **5,252** | **3,995** | **76%** | **5,326** | **4,261** | **80%** |

**ANNEX B1: DETAILED POPULATION AND WATER SUPPLY COVERAGE TARGETS, NRWSSP, 2014 - 2026**

| PROV. | MUN. | COMUNA | | POP. RATE (%) | 2009 POP. EST. (x1000) | 2009 TOTAL ACCESS NO. (x1000) | 2009 TOTAL ACCESS RATE (%) | 2014 POP. EST. (x1000) | 2014 TOTAL ACCESS NO. (x1000) | 2014 TOTAL ACCESS RATE (%) | 2015 POP. EST. (x1000) | 2015 TOTAL ACCESS NO. (x1000) | 2015 TOTAL ACCESS RATE (%) | 2016 POP. EST. (x1000) | 2016 TOTAL ACCESS NO. (x1000) | 2016 TOTAL ACCESS RATE (%) | 2017 POP. EST. (x1000) | 2017 TOTAL ACCESS NO. (x1000) | 2017 TOTAL ACCESS RATE (%) | 2018 POP. EST. (x1000) | 2018 TOTAL ACCESS NO. (x1000) | 2018 TOTAL ACCESS RATE (%) | 2019 POP. EST. (x1000) | 2019 TOTAL ACCESS NO. (x1000) | 2019 TOTAL ACCESS RATE (%) | 2020 POP. EST. (x1000) | 2020 TOTAL ACCESS NO. (x1000) | 2020 TOTAL ACCESS RATE (%) | 2021 POP. EST. (x1000) | 2021 TOTAL ACCESS NO. (x1000) | 2021 TOTAL ACCESS RATE (%) | 2022 POP. EST. (x1000) | 2022 TOTAL ACCESS NO. (x1000) | 2022 TOTAL ACCESS RATE (%) | 2023 POP. EST. (x1000) | 2023 TOTAL ACCESS NO. (x1000) | 2023 TOTAL ACCESS RATE (%) | 2024 POP. EST. (x1000) | 2024 TOTAL ACCESS NO. (x1000) | 2024 TOTAL ACCESS RATE (%) | 2025 POP. EST. (x1000) | 2025 TOTAL ACCESS NO. (x1000) | 2025 TOTAL ACCESS RATE (%) | 2026 POP. EST. (x1000) | 2026 TOTAL ACCESS NO. (x1000) | 2026 TOTAL ACCESS RATE (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PILOT PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Huambo | 11 | | 25 | | 375.3 | 83.8 | 22% | 402.3 | 83.8 | 21% | 408.0 | 114.2 | 28% | 413.7 | 178.0 | 43% | 419.5 | 250.9 | 60% | 425.4 | 308.6 | 73% | 431.3 | 339.0 | 79% | 437.4 | 349.6 | 80% | 443.5 | 355.9 | 80% | 449.7 | 362.3 | 81% | 456.0 | 368.6 | 81% | 462.4 | 374.9 | 81% | 468.8 | 381.3 | 81% | 475.4 | 387.6 | 82% |
| Lunda Sul | 4 | | 10 | | 141.6 | 5.4 | 4% | 151.8 | 5.4 | 4% | 153.9 | 18.7 | 12% | 156.1 | 46.8 | 30% | 158.3 | 78.9 | 50% | 160.5 | 104.3 | 65% | 162.7 | 117.6 | 72% | 165.0 | 122.3 | 74% | 167.3 | 125.1 | 75% | 169.7 | 127.9 | 75% | 172.0 | 130.6 | 76% | 174.5 | 133.4 | 76% | 176.9 | 136.2 | 77% | 179.4 | 139.0 | 77% |
| Uige | 13 | | 31 | | 252.9 | 30.1 | 12% | 271.1 | 30.1 | 11% | 274.9 | 52.5 | 19% | 278.7 | 99.5 | 36% | 282.6 | 153.2 | 54% | 286.6 | 195.7 | 68% | 290.6 | 218.1 | 75% | 294.7 | 225.9 | 77% | 298.8 | 230.6 | 77% | 303.0 | 235.2 | 78% | 307.2 | 239.9 | 78% | 311.5 | 244.5 | 79% | 315.9 | 249.2 | 79% | 320.3 | 253.9 | 79% |
| **TOTAL** | **28** | | **66** | | **770** | **119** | **15%** | **825** | **119** | **14%** | **837** | **185** | **22%** | **849** | **324** | **38%** | **860** | **483** | **56%** | **872** | **609** | **70%** | **885** | **675** | **76%** | **897** | **698** | **78%** | **910** | **712** | **78%** | **922** | **725** | **79%** | **935** | **739** | **79%** | **948** | **753** | **79%** | **962** | **767** | **80%** | **975** | **780** | **80%** |

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 NEW ACCESS (x1000) | 2014 COST (x1000) | 2014 CUM. COST (x1000) | 2015 NEW ACCESS (x1000) | 2015 COST (x1000) | 2015 CUM. COST (x1000) | 2016 NEW ACCESS (x1000) | 2016 COST (x1000) | 2016 CUM. COST (x1000) | 2017 NEW ACCESS (x1000) | 2017 COST (x1000) | 2017 CUM. COST (x1000) | 2018 NEW ACCESS (x1000) | 2018 COST (x1000) | 2018 CUM. COST (x1000) | 2019 NEW ACCESS (x1000) | 2019 COST (x1000) | 2019 CUM. COST (x1000) | 2020 NEW ACCESS (x1000) | 2020 COST (x1000) | 2020 CUM. COST (x1000) | 2021 NEW ACCESS (x1000) | 2021 COST (x1000) | 2021 CUM. COST (x1000) | 2022 NEW ACCESS (x1000) | 2022 COST (x1000) | 2022 CUM. COST (x1000) | 2023 NEW ACCESS (x1000) | 2023 COST (x1000) | 2023 CUM. COST (x1000) | 2024 NEW ACCESS (x1000) | 2024 COST (x1000) | 2024 CUM. COST (x1000) | 2025 NEW ACCESS (x1000) | 2025 COST (x1000) | 2025 CUM. COST (x1000) | 2026 NEW ACCESS (x1000) | 2026 COST (x1000) | 2026 CUM. COST (x1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECTION BY COMUNA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | Caxito (Dande) | Barra do Dande | 108.25 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.1 | 17 | 38 | 0.2 | 22 | 60 | 0.2 | 26 | 86 | 0.2 | 27 | 113 | 0.2 | 21 | 134 | 0.2 | 22 | 156 | 0.2 | 23 | 179 | 0.2 | 23 | 202 | 0.2 | 24 | 226 | 0.2 | 25 | 251 |
| Bengo | Caxito (Dande) | Quicabo | 108.25 | 0.0 | 0 | 0 | 0.2 | 21 | 21 | 0.3 | 33 | 54 | 0.4 | 42 | 96 | 0.5 | 55 | 151 | 0.5 | 65 | 216 | 0.5 | 67 | 284 | 0.4 | 54 | 337 | 0.4 | 55 | 392 | 0.4 | 57 | 449 | 0.4 | 59 | 508 | 0.4 | 60 | 568 | 0.4 | 62 | 631 |
| Bengo | Caxito (Dande) | Mabubas | 108.25 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.6 | 66 | 109 | 0.7 | 85 | 194 | 0.9 | 111 | 305 | 1.1 | 133 | 438 | 1.1 | 137 | 575 | 0.8 | 109 | 683 | 0.8 | 112 | 795 | 0.8 | 115 | 911 | 0.8 | 119 | 1,029 | 0.8 | 122 | 1,152 | 0.8 | 126 | 1,278 |
| Bengo | Catete (Icolo e Ben | Bom Jesus | 108.25 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 38 | 63 | 0.4 | 49 | 112 | 0.5 | 64 | 177 | 0.6 | 77 | 254 | 0.6 | 79 | 333 | 0.5 | 63 | 396 | 0.5 | 65 | 460 | 0.5 | 67 | 527 | 0.5 | 69 | 596 | 0.5 | 71 | 667 | 0.5 | 73 | 740 |
| Bengo | Catete (Icolo e Ben | Kakulo - Kahango | 108.25 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 10 | 16 | 0.1 | 12 | 28 | 0.1 | 16 | 45 | 0.2 | 19 | 64 | 0.2 | 20 | 84 | 0.1 | 16 | 100 | 0.1 | 16 | 117 | 0.1 | 17 | 133 | 0.1 | 17 | 151 | 0.1 | 18 | 169 | 0.1 | 18 | 187 |
| Bengo | Catete (Icolo e Ben | Kassoneca | 108.25 | 0.0 | 0 | 0 | 0.1 | 16 | 16 | 0.2 | 24 | 40 | 0.3 | 31 | 72 | 0.3 | 41 | 113 | 0.4 | 49 | 162 | 0.4 | 50 | 212 | 0.3 | 40 | 252 | 0.3 | 41 | 293 | 0.3 | 43 | 336 | 0.3 | 44 | 380 | 0.3 | 45 | 425 | 0.3 | 46 | 471 |
| Bengo | Quissama | Demba Chio | 108.25 | 0.0 | 0 | 0 | 0.1 | 14 | 14 | 0.2 | 21 | 35 | 0.2 | 28 | 63 | 0.3 | 36 | 99 | 0.3 | 43 | 142 | 0.3 | 44 | 186 | 0.3 | 35 | 222 | 0.3 | 36 | 258 | 0.3 | 37 | 295 | 0.3 | 39 | 334 | 0.3 | 40 | 374 | 0.3 | 41 | 414 |
| Bengo | Quissama | Mumbondo | 108.25 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 20 | 32 | 0.2 | 25 | 58 | 0.3 | 33 | 91 | 0.3 | 39 | 130 | 0.3 | 41 | 171 | 0.2 | 32 | 203 | 0.2 | 33 | 236 | 0.2 | 34 | 271 | 0.2 | 35 | 306 | 0.2 | 36 | 342 | 0.2 | 37 | 380 |
| Bengo | Quissama | Quixinge | 108.25 | 0.0 | 0 | 0 | 0.1 | 7 | 7 | 0.1 | 11 | 18 | 0.1 | 14 | 32 | 0.1 | 18 | 50 | 0.2 | 22 | 71 | 0.2 | 22 | 93 | 0.1 | 18 | 111 | 0.1 | 18 | 129 | 0.1 | 19 | 148 | 0.1 | 19 | 167 | 0.1 | 20 | 187 | 0.1 | 20 | 207 |
| Bengo | Quissama | Cabo Ledo | 108.25 | 0.0 | 0 | 0 | 0.2 | 19 | 19 | 0.2 | 29 | 47 | 0.3 | 37 | 84 | 0.4 | 48 | 132 | 0.5 | 57 | 189 | 0.5 | 59 | 248 | 0.4 | 47 | 295 | 0.4 | 48 | 344 | 0.4 | 50 | 394 | 0.4 | 51 | 445 | 0.4 | 53 | 498 | 0.4 | 54 | 553 |
| Bengo | Ambriz | Bela Vista | 108.25 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 5 | 9 | 0.1 | 7 | 16 | 0.1 | 9 | 24 | 0.1 | 11 | 35 | 0.1 | 11 | 46 | 0.1 | 9 | 55 | 0.1 | 9 | 63 | 0.1 | 9 | 73 | 0.1 | 9 | 82 | 0.1 | 10 | 92 | 0.1 | 10 | 102 |
| Bengo | Nambuangongo | Cage | 108.25 | 0.0 | 0 | 0 | 0.4 | 42 | 42 | 0.6 | 65 | 107 | 0.7 | 84 | 191 | 0.9 | 110 | 301 | 1.0 | 131 | 431 | 1.0 | 135 | 566 | 0.8 | 107 | 673 | 0.8 | 110 | 783 | 0.8 | 114 | 897 | 0.8 | 117 | 1,014 | 0.8 | 121 | 1,134 | 0.8 | 124 | 1,258 |
| Bengo | Nambuangongo | Gombe | 108.25 | 0.0 | 0 | 0 | 0.2 | 27 | 27 | 0.4 | 41 | 68 | 0.4 | 53 | 121 | 0.6 | 69 | 190 | 0.7 | 82 | 272 | 0.7 | 85 | 357 | 0.5 | 68 | 425 | 0.5 | 70 | 494 | 0.5 | 72 | 566 | 0.5 | 74 | 640 | 0.5 | 76 | 716 | 0.5 | 78 | 794 |
| Bengo | Nambuangongo | Quicunzo | 108.25 | 0.0 | 0 | 0 | 0.2 | 23 | 23 | 0.3 | 36 | 60 | 0.4 | 47 | 106 | 0.5 | 61 | 167 | 0.6 | 72 | 239 | 0.6 | 75 | 314 | 0.4 | 59 | 373 | 0.4 | 61 | 434 | 0.4 | 63 | 497 | 0.4 | 65 | 562 | 0.4 | 67 | 629 | 0.4 | 69 | 698 |
| Bengo | Nambuangongo | Quixico | 108.25 | 0.0 | 0 | 0 | 0.1 | 16 | 16 | 0.2 | 25 | 41 | 0.3 | 32 | 74 | 0.3 | 42 | 116 | 0.4 | 50 | 166 | 0.4 | 52 | 217 | 0.3 | 41 | 259 | 0.3 | 42 | 301 | 0.3 | 44 | 345 | 0.3 | 45 | 390 | 0.3 | 46 | 436 | 0.3 | 48 | 484 |
| Bengo | Nambuangongo | Zala | 108.25 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.1 | 16 | 26 | 0.2 | 20 | 46 | 0.2 | 26 | 73 | 0.3 | 32 | 104 | 0.3 | 33 | 137 | 0.2 | 26 | 163 | 0.2 | 27 | 189 | 0.2 | 27 | 217 | 0.2 | 28 | 245 | 0.2 | 29 | 274 | 0.2 | 30 | 304 |
| Bengo | Bula - Atumba | Quiage | 108.25 | 0.0 | 0 | 0 | 0.2 | 19 | 19 | 0.2 | 29 | 47 | 0.3 | 37 | 84 | 0.4 | 48 | 132 | 0.5 | 57 | 189 | 0.5 | 59 | 248 | 0.4 | 47 | 295 | 0.4 | 48 | 344 | 0.4 | 50 | 394 | 0.4 | 51 | 445 | 0.4 | 53 | 498 | 0.4 | 54 | 553 |
| Bengo | Dembos | Piri | 108.25 | 0.0 | 0 | 0 | 0.2 | 27 | 27 | 0.4 | 42 | 70 | 0.5 | 54 | 124 | 0.6 | 71 | 195 | 0.7 | 85 | 279 | 0.7 | 87 | 367 | 0.5 | 69 | 436 | 0.5 | 71 | 507 | 0.5 | 74 | 581 | 0.5 | 76 | 657 | 0.5 | 78 | 735 | 0.5 | 80 | 815 |
| Bengo | Dembos | Paredes | 108.25 | 0.0 | 0 | 0 | 0.3 | 29 | 29 | 0.4 | 45 | 74 | 0.5 | 58 | 131 | 0.6 | 75 | 206 | 0.7 | 90 | 296 | 0.7 | 92 | 388 | 0.6 | 73 | 462 | 0.6 | 76 | 537 | 0.6 | 78 | 615 | 0.6 | 80 | 696 | 0.6 | 83 | 778 | 0.6 | 85 | 863 |
| Bengo | Dembos | Coxe | 108.25 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 39 | 65 | 0.4 | 51 | 116 | 0.5 | 66 | 182 | 0.6 | 79 | 260 | 0.6 | 81 | 342 | 0.5 | 65 | 406 | 0.5 | 67 | 473 | 0.5 | 69 | 542 | 0.5 | 71 | 612 | 0.5 | 73 | 685 | 0.5 | 75 | 760 |
| Bengo | Pango - Aluquém | Cazua | 108.25 | 0.0 | 0 | 0 | 0.2 | 28 | 28 | 0.4 | 43 | 71 | 0.5 | 55 | 126 | 0.6 | 72 | 198 | 0.7 | 86 | 284 | 0.7 | 89 | 372 | 0.5 | 70 | 443 | 0.5 | 73 | 516 | 0.5 | 75 | 590 | 0.5 | 77 | 667 | 0.5 | 79 | 747 | 0.5 | 82 | 828 |
| Benguela | Baía Farta | Calohanga | 92.93 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 5 | 8 | 0.1 | 6 | 14 | 0.1 | 8 | 22 | 0.1 | 10 | 32 | 0.1 | 10 | 41 | 0.1 | 8 | 49 | 0.1 | 8 | 57 | 0.1 | 8 | 66 | 0.1 | 9 | 74 | 0.1 | 9 | 83 | 0.1 | 9 | 92 |
| Benguela | Baía Farta | Equimina | 92.93 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 6 | 9 | 0.1 | 7 | 17 | 0.1 | 10 | 27 | 0.1 | 12 | 38 | 0.1 | 12 | 50 | 0.1 | 9 | 60 | 0.1 | 10 | 69 | 0.1 | 10 | 79 | 0.1 | 10 | 90 | 0.1 | 11 | 100 | 0.1 | 11 | 111 |
| Benguela | Baía Farta | Zona Maritima Su | 92.93 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.2 | 16 | 38 | 0.2 | 22 | 59 | 0.2 | 26 | 85 | 0.2 | 26 | 111 | 0.2 | 21 | 132 | 0.2 | 22 | 154 | 0.2 | 22 | 176 | 0.2 | 23 | 199 | 0.2 | 24 | 223 | 0.2 | 24 | 247 |
| Benguela | Lobito | Canata | 92.93 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 13 | 22 | 0.2 | 17 | 39 | 0.2 | 22 | 61 | 0.2 | 26 | 87 | 0.2 | 27 | 114 | 0.2 | 22 | 136 | 0.2 | 22 | 158 | 0.2 | 23 | 181 | 0.2 | 24 | 205 | 0.2 | 24 | 229 | 0.2 | 25 | 254 |
| Benguela | Lobito | Canjala | 92.93 | 0.0 | 0 | 0 | 1.2 | 119 | 119 | 1.9 | 184 | 302 | 2.3 | 236 | 539 | 2.9 | 308 | 847 | 3.4 | 368 | 1,215 | 3.4 | 379 | 1,594 | 2.6 | 302 | 1,896 | 2.6 | 311 | 2,206 | 2.6 | 320 | 2,526 | 2.6 | 330 | 2,856 | 2.6 | 339 | 3,195 | 2.6 | 350 | 3,545 |
| Benguela | Lobito | Egipto Praia | 92.93 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 7 | 11 | 0.1 | 9 | 19 | 0.1 | 11 | 31 | 0.1 | 13 | 44 | 0.1 | 14 | 57 | 0.1 | 11 | 68 | 0.1 | 11 | 79 | 0.1 | 12 | 91 | 0.1 | 12 | 103 | 0.1 | 12 | 115 | 0.1 | 13 | 128 |
| Benguela | Cubal | Iambala | 92.93 | 0.0 | 0 | 0 | 1.3 | 126 | 126 | 2.0 | 194 | 320 | 2.5 | 250 | 571 | 3.1 | 327 | 897 | 3.6 | 390 | 1,287 | 3.6 | 401 | 1,688 | 2.8 | 319 | 2,007 | 2.8 | 329 | 2,336 | 2.8 | 339 | 2,675 | 2.8 | 349 | 3,024 | 2.8 | 359 | 3,383 | 2.8 | 370 | 3,754 |
| Benguela | Cubal | Capupa | 92.93 | 0.0 | 0 | 0 | 0.6 | 59 | 59 | 0.9 | 92 | 151 | 1.2 | 118 | 269 | 1.5 | 154 | 423 | 1.7 | 184 | 607 | 1.7 | 189 | 796 | 1.3 | 151 | 947 | 1.3 | 155 | 1,102 | 1.3 | 160 | 1,262 | 1.3 | 165 | 1,427 | 1.3 | 170 | 1,596 | 1.3 | 175 | 1,771 |
| Benguela | Cubal | Tumbulo | 92.93 | 0.0 | 0 | 0 | 1.0 | 94 | 94 | 1.5 | 145 | 238 | 1.8 | 186 | 425 | 2.3 | 243 | 668 | 2.7 | 290 | 957 | 2.7 | 299 | 1,256 | 2.1 | 238 | 1,494 | 2.1 | 245 | 1,738 | 2.1 | 252 | 1,990 | 2.1 | 260 | 2,250 | 2.1 | 267 | 2,517 | 2.1 | 275 | 2,793 |
| Benguela | Ganda | Babaera | 92.93 | 0.0 | 0 | 0 | 0.9 | 84 | 84 | 1.3 | 129 | 213 | 1.6 | 167 | 380 | 2.1 | 217 | 597 | 2.4 | 259 | 856 | 2.4 | 267 | 1,123 | 1.9 | 212 | 1,335 | 1.9 | 219 | 1,554 | 1.9 | 225 | 1,779 | 1.9 | 232 | 2,011 | 1.9 | 239 | 2,250 | 1.9 | 246 | 2,497 |
| Benguela | Ganda | Chicuma | 92.93 | 0.0 | 0 | 0 | 0.6 | 56 | 56 | 0.9 | 87 | 144 | 1.1 | 112 | 256 | 1.4 | 147 | 403 | 1.6 | 175 | 577 | 1.6 | 180 | 757 | 1.3 | 143 | 901 | 1.3 | 148 | 1,048 | 1.3 | 152 | 1,200 | 1.3 | 157 | 1,357 | 1.3 | 161 | 1,518 | 1.3 | 166 | 1,684 |
| Benguela | Ganda | Casseque | 92.93 | 0.0 | 0 | 0 | 0.3 | 32 | 32 | 0.5 | 50 | 82 | 0.6 | 64 | 145 | 0.8 | 83 | 228 | 0.9 | 99 | 328 | 0.9 | 102 | 430 | 0.7 | 81 | 511 | 0.7 | 84 | 595 | 0.7 | 86 | 681 | 0.7 | 89 | 770 | 0.7 | 92 | 861 | 0.7 | 94 | 956 |
| Benguela | Balombo | Chingongo | 92.93 | 0.0 | 0 | 0 | 0.3 | 31 | 31 | 0.5 | 48 | 79 | 0.6 | 62 | 140 | 0.8 | 80 | 221 | 0.9 | 96 | 317 | 0.9 | 99 | 415 | 0.7 | 79 | 494 | 0.7 | 81 | 575 | 0.7 | 83 | 658 | 0.7 | 86 | 744 | 0.7 | 88 | 832 | 0.7 | 91 | 923 |
| Benguela | Balombo | Chindumbo | 92.93 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.6 | 61 | 100 | 0.8 | 78 | 179 | 1.0 | 102 | 281 | 1.1 | 122 | 403 | 1.1 | 126 | 529 | 0.9 | 100 | 629 | 0.9 | 103 | 732 | 0.9 | 106 | 838 | 0.9 | 109 | 948 | 0.9 | 113 | 1,060 | 0.9 | 116 | 1,176 |
| Benguela | Balombo | Maka-Mambo | 92.93 | 0.0 | 0 | 0 | 0.1 | 14 | 14 | 0.2 | 22 | 37 | 0.3 | 29 | 65 | 0.4 | 37 | 102 | 0.4 | 44 | 147 | 0.4 | 46 | 193 | 0.3 | 36 | 229 | 0.3 | 38 | 266 | 0.3 | 39 | 305 | 0.3 | 40 | 345 | 0.3 | 41 | 386 | 0.3 | 42 | 428 |
| Benguela | Bocoio | Chila | 92.93 | 0.0 | 0 | 0 | 0.4 | 36 | 36 | 0.6 | 56 | 93 | 0.7 | 73 | 165 | 0.9 | 95 | 260 | 1.0 | 113 | 373 | 1.0 | 116 | 489 | 0.8 | 93 | 581 | 0.8 | 95 | 677 | 0.8 | 98 | 775 | 0.8 | 101 | 876 | 0.8 | 104 | 980 | 0.8 | 107 | 1,087 |
| Benguela | Bocoio | Monte Belo | 92.93 | 0.0 | 0 | 0 | 0.6 | 54 | 54 | 0.9 | 84 | 138 | 1.1 | 108 | 247 | 1.3 | 141 | 388 | 1.6 | 168 | 556 | 1.6 | 173 | 729 | 1.2 | 138 | 867 | 1.2 | 142 | 1,009 | 1.2 | 146 | 1,156 | 1.2 | 151 | 1,307 | 1.2 | 155 | 1,462 | 1.2 | 160 | 1,622 |
| Benguela | Bocoio | Cubal do Lumbo | 92.93 | 0.0 | 0 | 0 | 0.7 | 71 | 71 | 1.1 | 109 | 180 | 1.4 | 141 | 321 | 1.8 | 184 | 505 | 2.0 | 219 | 725 | 2.0 | 226 | 951 | 1.6 | 180 | 1,130 | 1.6 | 185 | 1,316 | 1.6 | 191 | 1,506 | 1.6 | 196 | 1,703 | 1.6 | 202 | 1,905 | 1.6 | 208 | 2,114 |
| Benguela | Caimbambo | Canhamela | 92.93 | 0.0 | 0 | 0 | 0.3 | 26 | 26 | 0.4 | 40 | 66 | 0.5 | 51 | 117 | 0.6 | 67 | 184 | 0.7 | 80 | 265 | 0.7 | 82 | 347 | 0.6 | 66 | 413 | 0.6 | 68 | 480 | 0.6 | 70 | 550 | 0.6 | 72 | 622 | 0.6 | 74 | 696 | 0.6 | 76 | 772 |
| Benguela | Caimbambo | Cayavi | 92.93 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 10 | 16 | 0.1 | 12 | 28 | 0.2 | 16 | 44 | 0.2 | 19 | 63 | 0.2 | 20 | 83 | 0.1 | 16 | 99 | 0.1 | 16 | 115 | 0.1 | 17 | 131 | 0.1 | 17 | 148 | 0.1 | 18 | 166 | 0.1 | 18 | 184 |
| Benguela | Chongoroi | Bolonguera | 92.93 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.2 | 16 | 37 | 0.2 | 21 | 58 | 0.2 | 25 | 83 | 0.2 | 26 | 109 | 0.2 | 21 | 130 | 0.2 | 21 | 151 | 0.2 | 22 | 173 | 0.2 | 23 | 195 | 0.2 | 23 | 218 | 0.2 | 24 | 242 |
| Bié | Kuito | Trumba | 100.64 | 0.0 | 0 | 0 | 1.2 | 126 | 126 | 1.8 | 195 | 320 | 2.3 | 250 | 571 | 2.9 | 327 | 898 | 3.3 | 390 | 1,287 | 3.3 | 401 | 1,689 | 2.6 | 319 | 2,008 | 2.6 | 329 | 2,337 | 2.6 | 339 | 2,676 | 2.6 | 349 | 3,025 | 2.6 | 360 | 3,385 | 2.6 | 370 | 3,755 |
| Bié | Kuito | Cambandua | 100.64 | 0.0 | 0 | 0 | 1.4 | 144 | 144 | 2.1 | 223 | 368 | 2.6 | 287 | 655 | 3.3 | 375 | 1,030 | 3.8 | 447 | 1,476 | 3.8 | 460 | 1,937 | 3.0 | 366 | 2,303 | 3.0 | 377 | 2,681 | 3.0 | 389 | 3,069 | 3.0 | 400 | 3,470 | 3.0 | 412 | 3,882 | 3.0 | 425 | 4,307 |
| Bié | Kuito | Chicala | 100.64 | 0.0 | 0 | 0 | 2.8 | 290 | 290 | 4.2 | 448 | 739 | 5.2 | 577 | 1,316 | 6.6 | 753 | 2,069 | 7.7 | 898 | 2,967 | 7.7 | 925 | 3,893 | 5.9 | 736 | 4,629 | 5.9 | 758 | 5,388 | 5.9 | 781 | 6,169 | 5.9 | 805 | 6,974 | 5.9 | 829 | 7,802 | 5.9 | 854 | 8,656 |
| Bié | Kuito | Cunje | 100.64 | 0.0 | 0 | 0 | 0.4 | 45 | 45 | 0.7 | 70 | 115 | 0.8 | 90 | 205 | 1.0 | 117 | 322 | 1.2 | 140 | 461 | 1.2 | 144 | 605 | 0.9 | 114 | 719 | 0.9 | 118 | 837 | 0.9 | 121 | 959 | 0.9 | 125 | 1,084 | 0.9 | 129 | 1,213 | 0.9 | 133 | 1,345 |
| Bié | Cunhinga (Vouga) | Belo Horizonte | 100.64 | 0.0 | 0 | 0 | 0.7 | 76 | 76 | 1.1 | 117 | 193 | 1.4 | 151 | 344 | 1.7 | 197 | 541 | 2.0 | 235 | 775 | 2.0 | 242 | 1,017 | 1.6 | 192 | 1,210 | 1.6 | 198 | 1,408 | 1.6 | 204 | 1,612 | 1.6 | 210 | 1,822 | 1.6 | 217 | 2,039 | 1.6 | 223 | 2,262 |
| Bié | Chinguar | Cutato | 100.64 | 0.0 | 0 | 0 | 0.8 | 83 | 83 | 1.2 | 128 | 211 | 1.5 | 165 | 375 | 1.9 | 215 | 590 | 2.2 | 256 | 847 | 2.2 | 264 | 1,111 | 1.7 | 210 | 1,321 | 1.7 | 216 | 1,537 | 1.7 | 223 | 1,760 | 1.7 | 230 | 1,990 | 1.7 | 236 | 2,226 | 1.7 | 244 | 2,470 |
| Bié | Chinguar | Cangote | 100.64 | 0.0 | 0 | 0 | 0.5 | 48 | 48 | 0.7 | 74 | 121 | 0.9 | 95 | 216 | 1.1 | 124 | 340 | 1.3 | 148 | 488 | 1.3 | 152 | 640 | 1.0 | 121 | 761 | 1.0 | 125 | 886 | 1.0 | 128 | 1,014 | 1.0 | 132 | 1,146 | 1.0 | 136 | 1,283 | 1.0 | 140 | 1,423 |
| Bié | Andulo | Chivaulo | 100.64 | 0.0 | 0 | 0 | 1.0 | 101 | 101 | 1.5 | 155 | 256 | 1.8 | 200 | 456 | 2.3 | 261 | 717 | 2.7 | 311 | 1,028 | 2.7 | 320 | 1,348 | 2.1 | 255 | 1,603 | 2.1 | 263 | 1,866 | 2.1 | 271 | 2,137 | 2.1 | 279 | 2,416 | 2.1 | 287 | 2,703 | 2.1 | 296 | 2,998 |
| Bié | Andulo | Cassumbe | 100.64 | 0.0 | 0 | 0 | 0.3 | 29 | 29 | 0.4 | 45 | 74 | 0.5 | 58 | 132 | 0.7 | 76 | 208 | 0.8 | 90 | 299 | 0.8 | 93 | 392 | 0.6 | 74 | 466 | 0.6 | 76 | 542 | 0.6 | 79 | 621 | 0.6 | 81 | 702 | 0.6 | 83 | 785 | 0.6 | 86 | 871 |
| Bié | Andulo | Calucinga | 100.64 | 0.0 | 0 | 0 | 1.2 | 121 | 121 | 1.8 | 188 | 309 | 2.2 | 242 | 551 | 2.8 | 315 | 866 | 3.2 | 376 | 1,242 | 3.2 | 387 | 1,629 | 2.5 | 308 | 1,937 | 2.5 | 317 | 2,255 | 2.5 | 327 | 2,582 | 2.5 | 337 | 2,919 | 2.5 | 347 | 3,266 | 2.5 | 357 | 3,623 |
| Bié | Nharea | Gamba | 100.64 | 0.0 | 0 | 0 | 0.3 | 26 | 26 | 0.4 | 40 | 67 | 0.5 | 52 | 119 | 0.6 | 68 | 187 | 0.7 | 81 | 268 | 0.7 | 83 | 351 | 0.5 | 66 | 418 | 0.5 | 68 | 486 | 0.5 | 70 | 557 | 0.5 | 73 | 629 | 0.5 | 75 | 704 | 0.5 | 77 | 781 |
| Bié | Nharea | Caiei | 100.64 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.6 | 60 | 99 | 0.7 | 77 | 176 | 0.9 | 101 | 277 | 1.0 | 120 | 397 | 1.0 | 124 | 521 | 0.8 | 99 | 620 | 0.8 | 102 | 721 | 0.8 | 105 | 826 | 0.8 | 108 | 934 | 0.8 | 111 | 1,044 | 0.8 | 114 | 1,159 |
| Bié | Nharea | Lúbia | 100.64 | 0.0 | 0 | 0 | 0.2 | 22 | 22 | 0.3 | 34 | 57 | 0.4 | 44 | 101 | 0.5 | 58 | 158 | 0.6 | 69 | 227 | 0.6 | 71 | 298 | 0.5 | 56 | 354 | 0.5 | 58 | 412 | 0.5 | 60 | 472 | 0.5 | 62 | 534 | 0.5 | 63 | 597 | 0.5 | 65 | 663 |
| Bié | Nharea | Dando | 100.64 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 21 | 34 | 0.2 | 26 | 60 | 0.3 | 34 | 95 | 0.4 | 41 | 136 | 0.4 | 42 | 178 | 0.3 | 34 | 212 | 0.3 | 35 | 247 | 0.3 | 36 | 283 | 0.3 | 37 | 319 | 0.3 | 38 | 357 | 0.3 | 39 | 396 |
| Bié | Camacupa | Ringoma | 100.64 | 0.0 | 0 | 0 | 0.4 | 40 | 40 | 0.6 | 63 | 103 | 0.7 | 81 | 183 | 0.9 | 105 | 289 | 1.1 | 125 | 414 | 1.1 | 129 | 543 | 0.8 | 103 | 645 | 0.8 | 106 | 751 | 0.8 | 109 | 860 | 0.8 | 112 | 972 | 0.8 | 116 | 1,088 | 0.8 | 119 | 1,207 |
| Bié | Camacupa | Umpulo | 100.64 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.6 | 67 | 111 | 0.8 | 86 | 197 | 1.0 | 113 | 310 | 1.2 | 135 | 444 | 1.2 | 139 | 583 | 0.9 | 110 | 693 | 0.9 | 114 | 807 | 0.9 | 117 | 924 | 0.9 | 120 | 1,044 | 0.9 | 124 | 1,168 | 0.9 | 128 | 1,296 |
| Bié | Camacupa | St. António da Mu | 100.64 | 0.0 | 0 | 0 | 0.3 | 31 | 31 | 0.4 | 47 | 78 | 0.6 | 61 | 138 | 0.7 | 79 | 218 | 0.8 | 94 | 312 | 0.8 | 97 | 409 | 0.6 | 77 | 487 | 0.6 | 80 | 567 | 0.6 | 82 | 649 | 0.6 | 85 | 733 | 0.6 | 87 | 820 | 0.6 | 90 | 910 |
| Bié | Camacupa | Cuanza | 100.64 | 0.0 | 0 | 0 | 0.4 | 42 | 42 | 0.6 | 65 | 107 | 0.8 | 84 | 191 | 1.0 | 109 | 300 | 1.1 | 130 | 431 | 1.1 | 134 | 565 | 0.9 | 107 | 672 | 0.9 | 110 | 782 | 0.9 | 113 | 895 | 0.9 | 117 | 1,012 | 0.9 | 120 | 1,132 | 0.9 | 124 | 1,256 |
| Bié | Cuemba | Munhango | 100.64 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 12 | 26 | 0.1 | 15 | 41 | 0.2 | 18 | 59 | 0.2 | 18 | 78 | 0.1 | 15 | 92 | 0.1 | 15 | 107 | 0.1 | 16 | 123 | 0.1 | 16 | 139 | 0.1 | 17 | 155 | 0.1 | 17 | 172 |
| Bié | Cuemba | Luando | 100.64 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 11 | 26 | 0.1 | 15 | 41 | 0.2 | 18 | 59 | 0.2 | 18 | 77 | 0.1 | 15 | 92 | 0.1 | 15 | 107 | 0.1 | 15 | 122 | 0.1 | 16 | 138 | 0.1 | 16 | 154 | 0.1 | 17 | 171 |
| Bié | Chitembo | Cachingues | 100.64 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 20 | 32 | 0.2 | 25 | 57 | 0.3 | 33 | 90 | 0.3 | 39 | 129 | 0.3 | 40 | 169 | 0.3 | 32 | 201 | 0.3 | 33 | 234 | 0.3 | 34 | 268 | 0.3 | 35 | 303 | 0.3 | 36 | 339 | 0.3 | 37 | 377 |
| Bié | Chitembo | Mumbue | 100.64 | 0.0 | 0 | 0 | 0.1 | 15 | 15 | 0.2 | 23 | 38 | 0.3 | 29 | 67 | 0.3 | 38 | 106 | 0.4 | 46 | 151 | 0.4 | 47 | 199 | 0.3 | 38 | 236 | 0.3 | 39 | 275 | 0.3 | 40 | 315 | 0.3 | 41 | 356 | 0.3 | 42 | 398 | 0.3 | 44 | 442 |
| Bié | Chitembo | Mutumbo | 100.64 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 6 | 10 | 0.1 | 8 | 17 | 0.1 | 10 | 27 | 0.1 | 12 | 39 | 0.1 | 12 | 51 | 0.1 | 10 | 61 | 0.1 | 10 | 70 | 0.1 | 10 | 81 | 0.1 | 11 | 91 | 0.1 | 11 | 102 | 0.1 | 11 | 113 |
| Bié | Chitembo | Malengue | 100.64 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 23 | 0.2 | 18 | 41 | 0.2 | 24 | 65 | 0.2 | 28 | 93 | 0.2 | 29 | 122 | 0.2 | 23 | 145 | 0.2 | 24 | 169 | 0.2 | 25 | 194 | 0.2 | 25 | 219 | 0.2 | 26 | 245 | 0.2 | 27 | 272 |
| Bié | Chitembo | Soma Cuanza | 100.64 | 0.0 | 0 | 0 | 0.0 | 2 | 2 | 0.0 | 4 | 6 | 0.0 | 5 | 11 | 0.1 | 6 | 17 | 0.1 | 8 | 25 | 0.1 | 8 | 33 | 0.0 | 6 | 39 | 0.0 | 6 | 45 | 0.0 | 7 | 52 | 0.0 | 7 | 58 | 0.0 | 7 | 65 | 0.0 | 7 | 72 |
| Bié | Catabola | Chipeta | 100.64 | 0.0 | 0 | 0 | 0.5 | 52 | 52 | 0.7 | 80 | 132 | 0.9 | 103 | 234 | 1.2 | 134 | 369 | 1.4 | 160 | 529 | 1.4 | 165 | 693 | 1.1 | 131 | 824 | 1.1 | 135 | 960 | 1.1 | 139 | 1,099 | 1.1 | 143 | 1,242 | 1.1 | 148 | 1,390 | 1.1 | 152 | 1,542 |
| Bié | Catabola | Sande | 100.64 | 0.0 | 0 | 0 | 0.5 | 52 | 52 | 0.7 | 80 | 132 | 0.9 | 103 | 235 | 1.2 | 134 | 369 | 1.4 | 160 | 530 | 1.4 | 165 | 695 | 1.1 | 131 | 826 | 1.1 | 135 | 962 | 1.1 | 139 | 1,101 | 1.1 | 144 | 1,245 | 1.1 | 148 | 1,393 | 1.1 | 152 | 1,545 |
| Bié | Catabola | Caiuera | 100.64 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 38 | 62 | 0.4 | 49 | 111 | 0.6 | 63 | 174 | 0.6 | 76 | 250 | 0.6 | 78 | 328 | 0.5 | 62 | 390 | 0.5 | 64 | 454 | 0.5 | 66 | 519 | 0.5 | 68 | 587 | 0.5 | 70 | 657 | 0.5 | 72 | 729 |
| Bié | Catabola | Chiuca | 100.64 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.6 | 66 | 109 | 0.8 | 85 | 194 | 1.0 | 111 | 305 | 1.1 | 133 | 438 | 1.1 | 137 | 574 | 0.9 | 109 | 683 | 0.9 | 112 | 795 | 0.9 | 115 | 910 | 0.9 | 119 | 1,029 | 0.9 | 122 | 1,151 | 0.9 | 126 | 1,277 |
| Cabinda | Cabinda | Malembo | 91.69 | 0.0 | 0 | 0 | 0.3 | 25 | 25 | 0.4 | 38 | 63 | 0.5 | 49 | 112 | 0.6 | 64 | 175 | 0.7 | 76 | 252 | 0.7 | 78 | 330 | 0.6 | 62 | 392 | 0.6 | 64 | 457 | 0.6 | 66 | 523

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | NEW ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Huambo (2) | Tchicala-Tcholohai | Samboto | 104.72 | 0.0 | 0 | 0 | 0.6 | 63 | 63 | 1.2 | 137 | 200 | 1.4 | 161 | 361 | 1.1 | 131 | 492 | 0.6 | 71 | 564 | 0.2 | 26 | 589 | 0.1 | 16 | 605 | 0.1 | 16 | 621 | 0.1 | 17 | 638 | 0.1 | 17 | 655 | 0.1 | 18 | 673 | 0.1 | 18 | 691 |
| Huambo (2) | Cathihungo | Ciumbu | 104.72 | 0.0 | 0 | 0 | 1.7 | 184 | 184 | 3.6 | 398 | 582 | 4.1 | 469 | 1,051 | 3.2 | 382 | 1,434 | 1.7 | 207 | 1,641 | 0.6 | 75 | 1,716 | 0.4 | 46 | 1,761 | 0.4 | 47 | 1,809 | 0.4 | 49 | 1,857 | 0.4 | 50 | 1,907 | 0.4 | 52 | 1,959 | 0.4 | 53 | 2,012 |
| Huambo (2) | Cathihungo | Cinhama | 104.72 | 0.0 | 0 | 0 | 1.7 | 179 | 179 | 3.5 | 387 | 565 | 4.0 | 455 | 1,020 | 3.1 | 371 | 1,392 | 1.7 | 201 | 1,593 | 0.6 | 73 | 1,665 | 0.3 | 44 | 1,710 | 0.3 | 46 | 1,755 | 0.3 | 47 | 1,803 | 0.3 | 49 | 1,851 | 0.3 | 50 | 1,901 | 0.3 | 52 | 1,953 |
| Huambo (2) | Bailundo | M'bimbi | 104.72 | 0.0 | 0 | 0 | 0.9 | 94 | 94 | 1.8 | 203 | 297 | 2.1 | 239 | 535 | 1.7 | 195 | 730 | 0.9 | 106 | 835 | 0.3 | 38 | 873 | 0.2 | 23 | 897 | 0.2 | 24 | 921 | 0.2 | 25 | 945 | 0.2 | 25 | 971 | 0.2 | 26 | 997 | 0.2 | 27 | 1,024 |
| Huambo (2) | Bailundo | Lunji | 104.72 | 0.0 | 0 | 0 | 2.2 | 240 | 240 | 4.7 | 519 | 760 | 5.3 | 612 | 1,371 | 4.2 | 499 | 1,870 | 2.2 | 270 | 2,140 | 0.8 | 97 | 2,238 | 0.5 | 60 | 2,297 | 0.5 | 62 | 2,359 | 0.5 | 63 | 2,422 | 0.5 | 65 | 2,487 | 0.5 | 67 | 2,555 | 0.5 | 69 | 2,624 |
| Huambo (2) | Bailundo | Luvemba | 104.72 | 0.0 | 0 | 0 | 2.0 | 213 | 213 | 4.1 | 461 | 674 | 4.7 | 542 | 1,216 | 3.8 | 442 | 1,658 | 2.0 | 240 | 1,898 | 0.7 | 86 | 1,984 | 0.4 | 53 | 2,037 | 0.4 | 55 | 2,092 | 0.4 | 56 | 2,148 | 0.4 | 58 | 2,206 | 0.4 | 60 | 2,266 | 0.4 | 61 | 2,327 |
| Huambo (2) | Bailundo | Hengue (Calulo) | 104.72 | 0.0 | 0 | 0 | 1.9 | 202 | 202 | 3.9 | 438 | 640 | 4.5 | 515 | 1,155 | 3.6 | 420 | 1,576 | 1.9 | 228 | 1,803 | 0.7 | 82 | 1,885 | 0.4 | 50 | 1,936 | 0.4 | 52 | 1,988 | 0.4 | 53 | 2,041 | 0.4 | 55 | 2,096 | 0.4 | 57 | 2,153 | 0.4 | 58 | 2,211 |
| Huambo (2) | Caála | Cuima | 104.72 | 0.0 | 0 | 0 | 2.1 | 222 | 222 | 4.3 | 481 | 703 | 4.9 | 566 | 1,269 | 3.9 | 461 | 1,730 | 2.1 | 250 | 1,981 | 0.7 | 90 | 2,071 | 0.4 | 55 | 2,126 | 0.4 | 57 | 2,183 | 0.4 | 59 | 2,242 | 0.4 | 60 | 2,302 | 0.4 | 62 | 2,364 | 0.4 | 64 | 2,428 |
| Huambo (2) | Caála | Katata | 104.72 | 0.0 | 0 | 0 | 1.0 | 112 | 112 | 2.2 | 241 | 353 | 2.5 | 284 | 637 | 2.0 | 232 | 868 | 1.0 | 126 | 994 | 0.4 | 45 | 1,039 | 0.2 | 28 | 1,067 | 0.2 | 29 | 1,095 | 0.2 | 29 | 1,125 | 0.2 | 30 | 1,155 | 0.2 | 31 | 1,186 | 0.2 | 32 | 1,218 |
| Huambo (2) | Caála | Calenga | 104.72 | 0.0 | 0 | 0 | 1.0 | 110 | 110 | 2.1 | 237 | 347 | 2.4 | 279 | 626 | 1.9 | 228 | 854 | 1.0 | 123 | 977 | 0.4 | 44 | 1,022 | 0.2 | 27 | 1,049 | 0.2 | 28 | 1,077 | 0.2 | 29 | 1,106 | 0.2 | 30 | 1,136 | 0.2 | 31 | 1,167 | 0.2 | 32 | 1,198 |
| Huambo (2) | Ecunha | Quipeio | 104.72 | 0.0 | 0 | 0 | 1.1 | 114 | 114 | 2.2 | 247 | 361 | 2.5 | 291 | 652 | 2.0 | 237 | 890 | 1.1 | 129 | 1,018 | 0.4 | 46 | 1,065 | 0.2 | 28 | 1,093 | 0.2 | 29 | 1,122 | 0.2 | 30 | 1,153 | 0.2 | 31 | 1,184 | 0.2 | 32 | 1,216 | 0.2 | 33 | 1,249 |
| Huambo (2) | Ucuma | Mundundo | 104.72 | 0.0 | 0 | 0 | 0.4 | 40 | 40 | 0.8 | 86 | 126 | 0.9 | 102 | 228 | 0.7 | 83 | 310 | 0.4 | 45 | 355 | 0.1 | 16 | 371 | 0.1 | 10 | 381 | 0.1 | 10 | 392 | 0.1 | 11 | 402 | 0.1 | 11 | 413 | 0.1 | 11 | 424 | 0.1 | 11 | 436 |
| Huambo (2) | Longonjo | Lepi | 104.72 | 0.0 | 0 | 0 | 0.7 | 80 | 80 | 1.6 | 173 | 253 | 1.8 | 204 | 457 | 1.4 | 166 | 623 | 0.7 | 90 | 713 | 0.3 | 32 | 746 | 0.2 | 20 | 766 | 0.2 | 21 | 786 | 0.2 | 21 | 807 | 0.2 | 22 | 829 | 0.2 | 22 | 851 | 0.2 | 23 | 875 |
| Huambo (2) | Longonjo | Katavola | 104.72 | 0.0 | 0 | 0 | 0.2 | 27 | 27 | 0.5 | 58 | 85 | 0.6 | 69 | 154 | 0.5 | 56 | 210 | 0.2 | 30 | 240 | 0.1 | 11 | 251 | 0.1 | 7 | 258 | 0.1 | 7 | 265 | 0.1 | 7 | 272 | 0.1 | 7 | 279 | 0.1 | 8 | 287 | 0.1 | 8 | 295 |
| Huambo (2) | Longonjo | Chilata (Ngombe | 104.72 | 0.0 | 0 | 0 | 1.0 | 107 | 107 | 2.1 | 232 | 339 | 2.4 | 273 | 612 | 1.9 | 223 | 835 | 1.0 | 121 | 956 | 0.3 | 44 | 999 | 0.2 | 27 | 1,026 | 0.2 | 27 | 1,053 | 0.2 | 28 | 1,082 | 0.2 | 29 | 1,111 | 0.2 | 30 | 1,141 | 0.2 | 31 | 1,172 |
| Huambo (2) | Mungo | Kambuengo | 104.72 | 0.0 | 0 | 0 | 1.3 | 139 | 139 | 2.7 | 301 | 440 | 3.1 | 355 | 795 | 2.5 | 289 | 1,084 | 1.3 | 157 | 1,241 | 0.5 | 57 | 1,297 | 0.3 | 35 | 1,332 | 0.3 | 36 | 1,368 | 0.3 | 37 | 1,405 | 0.3 | 38 | 1,442 | 0.3 | 39 | 1,481 | 0.3 | 40 | 1,522 |
| Huambo (2) | Londuimbali | Kumbila (Katukulu | 104.72 | 0.0 | 0 | 0 | 0.4 | 42 | 42 | 0.8 | 91 | 133 | 0.9 | 107 | 239 | 0.7 | 87 | 327 | 0.4 | 47 | 374 | 0.1 | 17 | 391 | 0.1 | 10 | 401 | 0.1 | 11 | 412 | 0.1 | 11 | 423 | 0.1 | 11 | 434 | 0.1 | 12 | 446 | 0.1 | 12 | 458 |
| Huambo (2) | Londuimbali | Galanga | 104.72 | 0.0 | 0 | 0 | 0.9 | 95 | 95 | 1.9 | 206 | 301 | 2.1 | 243 | 544 | 1.7 | 198 | 742 | 0.9 | 107 | 849 | 0.3 | 39 | 888 | 0.2 | 24 | 911 | 0.2 | 24 | 936 | 0.2 | 25 | 961 | 0.2 | 26 | 987 | 0.2 | 27 | 1,013 | 0.2 | 27 | 1,041 |
| Huambo (2) | Londuimbali | Ussoke | 104.72 | 0.0 | 0 | 0 | 0.5 | 57 | 57 | 1.1 | 122 | 179 | 1.3 | 144 | 323 | 1.0 | 117 | 440 | 0.5 | 64 | 504 | 0.2 | 23 | 527 | 0.1 | 14 | 541 | 0.1 | 14 | 556 | 0.1 | 15 | 570 | 0.1 | 15 | 586 | 0.1 | 16 | 602 | 0.1 | 16 | 618 |
| Huambo (2) | Londuimbali | Alto Hama | 104.72 | 0.0 | 0 | 0 | 0.6 | 60 | 60 | 1.2 | 130 | 190 | 1.3 | 153 | 344 | 1.1 | 125 | 469 | 0.6 | 68 | 536 | 0.2 | 24 | 561 | 0.1 | 15 | 576 | 0.1 | 15 | 591 | 0.1 | 16 | 607 | 0.1 | 16 | 623 | 0.1 | 17 | 640 | 0.1 | 17 | 658 |
| Huambo (2) | Tchindjenje | Tchiaka | 104.72 | 0.0 | 0 | 0 | 0.4 | 48 | 48 | 0.9 | 104 | 152 | 1.1 | 123 | 275 | 0.8 | 100 | 375 | 0.4 | 54 | 429 | 0.2 | 20 | 449 | 0.1 | 12 | 461 | 0.1 | 12 | 473 | 0.1 | 13 | 486 | 0.1 | 13 | 499 | 0.1 | 13 | 512 | 0.1 | 14 | 526 |
| Huila | Lubango | Arrimba | 89.00 | 0.0 | 0 | 0 | 0.9 | 79 | 79 | 1.3 | 122 | 201 | 1.6 | 157 | 358 | 2.0 | 205 | 563 | 2.4 | 245 | 808 | 2.4 | 252 | 1,060 | 1.8 | 201 | 1,260 | 1.8 | 207 | 1,467 | 1.8 | 213 | 1,680 | 1.8 | 219 | 1,899 | 1.8 | 226 | 2,124 | 1.8 | 232 | 2,357 |
| Huila | Lubango | Huila | 89.00 | 0.0 | 0 | 0 | 1.1 | 98 | 98 | 1.6 | 152 | 250 | 2.0 | 195 | 445 | 2.5 | 255 | 700 | 2.9 | 304 | 1,005 | 2.9 | 313 | 1,318 | 2.3 | 249 | 1,567 | 2.3 | 257 | 1,824 | 2.3 | 264 | 2,088 | 2.3 | 272 | 2,361 | 2.3 | 281 | 2,641 | 2.3 | 289 | 2,930 |
| Huila | Lubango | Quilenda | 89.00 | 0.0 | 0 | 0 | 0.4 | 41 | 41 | 0.7 | 63 | 103 | 0.8 | 81 | 184 | 1.0 | 105 | 289 | 1.2 | 125 | 414 | 1.2 | 129 | 544 | 0.9 | 103 | 646 | 0.9 | 106 | 752 | 0.9 | 109 | 861 | 0.9 | 112 | 974 | 0.9 | 116 | 1,089 | 0.9 | 119 | 1,209 |
| Huila | Lubango | Hoque | 89.00 | 0.0 | 0 | 0 | 1.6 | 145 | 145 | 2.4 | 224 | 369 | 3.0 | 288 | 657 | 3.8 | 376 | 1,033 | 4.3 | 448 | 1,481 | 4.3 | 462 | 1,943 | 3.4 | 368 | 2,311 | 3.4 | 379 | 2,690 | 3.4 | 390 | 3,080 | 3.4 | 402 | 3,482 | 3.4 | 414 | 3,895 | 3.4 | 426 | 4,322 |
| Huila | Cacula | Vite-Vivali | 89.00 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 20 | 33 | 0.3 | 26 | 59 | 0.3 | 34 | 93 | 0.4 | 40 | 134 | 0.4 | 42 | 175 | 0.3 | 33 | 208 | 0.3 | 34 | 243 | 0.3 | 35 | 278 | 0.3 | 36 | 314 | 0.3 | 37 | 351 | 0.3 | 38 | 390 |
| Huila | Cacula | Tchituto | 89.00 | 0.0 | 0 | 0 | 0.5 | 42 | 42 | 0.7 | 65 | 107 | 0.9 | 84 | 190 | 1.1 | 109 | 299 | 1.3 | 130 | 430 | 1.3 | 134 | 563 | 1.0 | 107 | 670 | 1.0 | 110 | 780 | 1.0 | 113 | 893 | 1.0 | 116 | 1,009 | 1.0 | 120 | 1,129 | 1.0 | 124 | 1,253 |
| Huila | Cacula | Tchiquaqueia | 89.00 | 0.0 | 0 | 0 | 0.2 | 18 | 18 | 0.3 | 29 | 47 | 0.4 | 37 | 84 | 0.5 | 48 | 132 | 0.6 | 57 | 189 | 0.6 | 59 | 247 | 0.4 | 47 | 294 | 0.4 | 48 | 342 | 0.4 | 50 | 392 | 0.4 | 51 | 443 | 0.4 | 53 | 496 | 0.4 | 54 | 550 |
| Huila | Chibia | Jau | 89.00 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.2 | 16 | 27 | 0.2 | 21 | 47 | 0.3 | 27 | 74 | 0.3 | 32 | 107 | 0.3 | 33 | 140 | 0.2 | 27 | 167 | 0.2 | 27 | 194 | 0.2 | 28 | 222 | 0.2 | 29 | 251 | 0.2 | 30 | 281 | 0.2 | 31 | 312 |
| Huila | Caconda | Gungue | 89.00 | 0.0 | 0 | 0 | 1.4 | 125 | 125 | 2.0 | 193 | 318 | 2.6 | 248 | 566 | 3.2 | 324 | 890 | 3.7 | 386 | 1,276 | 3.7 | 398 | 1,674 | 2.9 | 317 | 1,991 | 2.9 | 326 | 2,317 | 2.9 | 336 | 2,653 | 2.9 | 346 | 2,999 | 2.9 | 356 | 3,356 | 2.9 | 367 | 3,723 |
| Huila | Caconda | Uaba | 89.00 | 0.0 | 0 | 0 | 0.9 | 83 | 83 | 1.4 | 129 | 212 | 1.7 | 166 | 378 | 2.2 | 216 | 594 | 2.5 | 258 | 851 | 2.5 | 265 | 1,117 | 1.9 | 211 | 1,328 | 1.9 | 218 | 1,546 | 1.9 | 224 | 1,770 | 1.9 | 231 | 2,001 | 1.9 | 238 | 2,239 | 1.9 | 245 | 2,484 |
| Huila | Caconda | Cusse | 89.00 | 0.0 | 0 | 0 | 0.8 | 70 | 70 | 1.1 | 107 | 177 | 1.4 | 138 | 315 | 1.8 | 180 | 496 | 2.1 | 215 | 711 | 2.1 | 222 | 933 | 1.6 | 176 | 1,109 | 1.6 | 182 | 1,291 | 1.6 | 187 | 1,478 | 1.6 | 193 | 1,671 | 1.6 | 199 | 1,869 | 1.6 | 205 | 2,074 |
| Huila | Caconda | Mundina | 89.00 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 10 | 16 | 0.1 | 13 | 29 | 0.2 | 16 | 45 | 0.2 | 19 | 64 | 0.2 | 20 | 84 | 0.1 | 16 | 100 | 0.1 | 16 | 117 | 0.1 | 17 | 134 | 0.1 | 17 | 151 | 0.1 | 18 | 169 | 0.1 | 19 | 188 |
| Huila | Caconda | Bandeira | 89.00 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.2 | 14 | 23 | 0.2 | 18 | 42 | 0.2 | 24 | 65 | 0.3 | 28 | 94 | 0.3 | 29 | 123 | 0.2 | 23 | 146 | 0.2 | 24 | 170 | 0.2 | 25 | 195 | 0.2 | 25 | 221 | 0.2 | 26 | 247 | 0.2 | 27 | 274 |
| Huila | Caluquembe | Calepi | 89.00 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 12 | 27 | 0.2 | 16 | 43 | 0.2 | 19 | 61 | 0.2 | 19 | 80 | 0.1 | 15 | 96 | 0.1 | 16 | 111 | 0.1 | 16 | 127 | 0.1 | 17 | 144 | 0.1 | 17 | 161 | 0.1 | 18 | 179 |
| Huila | Caluquembe | Negola | 89.00 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.6 | 59 | 97 | 0.8 | 76 | 172 | 1.0 | 99 | 271 | 1.1 | 118 | 389 | 1.1 | 121 | 510 | 0.9 | 96 | 606 | 0.9 | 99 | 706 | 0.9 | 102 | 808 | 0.9 | 105 | 914 | 0.9 | 109 | 1,022 | 0.9 | 112 | 1,134 |
| Huila | Caluquembe | Camacuio | 89.00 | 0.0 | 0 | 0 | 0.4 | 37 | 37 | 0.6 | 57 | 94 | 0.8 | 73 | 167 | 1.0 | 95 | 262 | 1.1 | 114 | 376 | 1.1 | 117 | 493 | 0.9 | 93 | 587 | 0.9 | 96 | 683 | 0.9 | 99 | 782 | 0.9 | 102 | 884 | 0.9 | 105 | 989 | 0.9 | 108 | 1,097 |
| Huila | Quilengues | Impulo | 89.00 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.6 | 60 | 98 | 0.8 | 77 | 175 | 1.0 | 100 | 276 | 1.2 | 120 | 395 | 1.2 | 123 | 518 | 0.9 | 98 | 617 | 0.9 | 101 | 718 | 0.9 | 104 | 822 | 0.9 | 107 | 929 | 0.9 | 110 | 1,039 | 0.9 | 114 | 1,153 |
| Huila | Quilengues | Dinde | 89.00 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.6 | 58 | 96 | 0.8 | 75 | 172 | 1.0 | 98 | 270 | 1.1 | 117 | 387 | 1.1 | 121 | 507 | 0.9 | 96 | 603 | 0.9 | 99 | 702 | 0.9 | 102 | 804 | 0.9 | 105 | 909 | 0.9 | 108 | 1,017 | 0.9 | 111 | 1,128 |
| Huila | Kuvango | Galangue | 89.00 | 0.0 | 0 | 0 | 0.6 | 54 | 54 | 0.9 | 84 | 138 | 1.1 | 108 | 246 | 1.4 | 141 | 387 | 1.6 | 168 | 555 | 1.6 | 173 | 728 | 1.3 | 138 | 866 | 1.3 | 142 | 1,008 | 1.3 | 146 | 1,154 | 1.3 | 151 | 1,305 | 1.3 | 155 | 1,460 | 1.3 | 160 | 1,619 |
| Huila | Kuvango | Indungo | 89.00 | 0.0 | 0 | 0 | 0.0 | 2 | 2 | 0.0 | 3 | 5 | 0.0 | 4 | 10 | 0.1 | 5 | 15 | 0.1 | 7 | 21 | 0.1 | 7 | 28 | 0.0 | 5 | 34 | 0.0 | 5 | 39 | 0.0 | 6 | 45 | 0.0 | 6 | 50 | 0.0 | 6 | 56 | 0.0 | 6 | 63 |
| Huila | Kuvango | Candumbo | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 1 | 2 | 0.0 | 2 | 4 | 0.0 | 2 | 6 | 0.0 | 3 | 9 | 0.0 | 3 | 12 | 0.0 | 2 | 14 | 0.0 | 2 | 16 | 0.0 | 2 | 18 | 0.0 | 2 | 21 | 0.0 | 2 | 23 | 0.0 | 3 | 26 |
| Huila | Quipungo | Cainda | 89.00 | 0.0 | 0 | 0 | 0.5 | 49 | 49 | 0.8 | 75 | 124 | 1.0 | 97 | 221 | 1.3 | 127 | 348 | 1.5 | 151 | 499 | 1.5 | 156 | 655 | 1.1 | 124 | 779 | 1.1 | 128 | 907 | 1.1 | 131 | 1,038 | 1.1 | 135 | 1,173 | 1.1 | 139 | 1,313 | 1.1 | 144 | 1,457 |
| Huila | Quipungo | Hombo | 89.00 | 0.0 | 0 | 0 | 0.4 | 34 | 34 | 0.6 | 52 | 86 | 0.7 | 67 | 154 | 0.9 | 88 | 242 | 1.0 | 105 | 347 | 1.0 | 108 | 455 | 0.8 | 86 | 541 | 0.8 | 89 | 629 | 0.8 | 91 | 721 | 0.8 | 94 | 815 | 0.8 | 97 | 911 | 0.8 | 100 | 1,011 |
| Huila | Quipungo | Chicungo | 89.00 | 0.0 | 0 | 0 | 1.0 | 94 | 94 | 1.5 | 146 | 240 | 1.9 | 188 | 427 | 2.4 | 245 | 672 | 2.8 | 292 | 964 | 2.8 | 301 | 1,264 | 2.2 | 239 | 1,504 | 2.2 | 246 | 1,750 | 2.2 | 254 | 2,004 | 2.2 | 261 | 2,265 | 2.2 | 269 | 2,534 | 2.2 | 277 | 2,812 |
| Huila | Quipungo | Tchiconco | 89.00 | 0.0 | 0 | 0 | 0.9 | 85 | 85 | 1.4 | 132 | 217 | 1.7 | 170 | 386 | 2.2 | 221 | 608 | 2.6 | 264 | 871 | 2.6 | 272 | 1,143 | 2.0 | 216 | 1,359 | 2.0 | 223 | 1,582 | 2.0 | 229 | 1,811 | 2.0 | 236 | 2,048 | 2.0 | 243 | 2,291 | 2.0 | 251 | 2,542 |
| Huila | Matala | Mulondo | 89.00 | 0.0 | 0 | 0 | 0.6 | 53 | 53 | 0.9 | 81 | 134 | 1.1 | 105 | 239 | 1.4 | 137 | 376 | 1.6 | 163 | 539 | 1.6 | 168 | 707 | 1.2 | 134 | 841 | 1.2 | 138 | 979 | 1.2 | 142 | 1,121 | 1.2 | 146 | 1,267 | 1.2 | 151 | 1,418 | 1.2 | 155 | 1,573 |
| Huila | Matala | Capelongo | 89.00 | 0.0 | 0 | 0 | 3.4 | 307 | 307 | 5.0 | 475 | 783 | 6.3 | 612 | 1,394 | 8.0 | 798 | 2,192 | 9.2 | 952 | 3,144 | 9.2 | 980 | 4,124 | 7.1 | 780 | 4,905 | 7.1 | 804 | 5,708 | 7.1 | 828 | 6,536 | 7.1 | 853 | 7,389 | 7.1 | 878 | 8,267 | 7.1 | 905 | 9,171 |
| Huila | Matala | Micosse | 89.00 | 0.0 | 0 | 0 | 0.4 | 34 | 34 | 0.6 | 53 | 87 | 0.7 | 68 | 156 | 0.9 | 89 | 245 | 1.0 | 106 | 351 | 1.0 | 109 | 461 | 0.8 | 87 | 548 | 0.8 | 90 | 637 | 0.8 | 92 | 730 | 0.8 | 95 | 825 | 0.8 | 98 | 923 | 0.8 | 101 | 1,024 |
| Huila | Matala | Sequendiva | 89.00 | 0.0 | 0 | 0 | 0.0 | 2 | 2 | 0.0 | 3 | 4 | 0.0 | 3 | 8 | 0.0 | 4 | 12 | 0.1 | 5 | 17 | 0.1 | 5 | 23 | 0.0 | 4 | 27 | 0.0 | 4 | 31 | 0.0 | 5 | 36 | 0.0 | 5 | 41 | 0.0 | 5 | 46 | 0.0 | 5 | 51 |
| Huila | Chicomba | Quê | 89.00 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.6 | 58 | 96 | 0.8 | 75 | 170 | 1.0 | 97 | 268 | 1.1 | 116 | 384 | 1.1 | 120 | 503 | 0.9 | 95 | 599 | 0.9 | 98 | 697 | 0.9 | 101 | 798 | 0.9 | 104 | 902 | 0.9 | 107 | 1,009 | 0.9 | 110 | 1,119 |
| Huila | Chicomba | Vila Real | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 1 | 1 | 0.0 | 1 | 3 | 0.0 | 1 | 4 | 0.0 | 2 | 6 | 0.0 | 2 | 8 | 0.0 | 1 | 9 | 0.0 | 2 | 11 | 0.0 | 2 | 12 | 0.0 | 2 | 14 | 0.0 | 2 | 16 | 0.0 | 2 | 17 |
| Huila | Jamba | Kussuva | 89.00 | 0.0 | 0 | 0 | 0.1 | 11 | 11 | 0.2 | 17 | 29 | 0.2 | 22 | 51 | 0.3 | 29 | 81 | 0.3 | 35 | 116 | 0.3 | 36 | 152 | 0.3 | 29 | 180 | 0.3 | 30 | 210 | 0.3 | 30 | 240 | 0.3 | 31 | 272 | 0.3 | 32 | 304 | 0.3 | 33 | 337 |
| Huila | Jamba | Dongo | 89.00 | 0.0 | 0 | 0 | 0.7 | 63 | 63 | 1.0 | 98 | 161 | 1.3 | 126 | 288 | 1.6 | 165 | 452 | 1.9 | 196 | 648 | 1.9 | 202 | 851 | 1.5 | 161 | 1,011 | 1.5 | 166 | 1,177 | 1.5 | 171 | 1,348 | 1.5 | 176 | 1,524 | 1.5 | 181 | 1,705 | 1.5 | 187 | 1,891 |
| Huila | Jamba | Tchamuteta (ex C | 89.00 | 0.0 | 0 | 0 | 0.3 | 29 | 29 | 0.5 | 45 | 74 | 0.6 | 57 | 131 | 0.7 | 75 | 206 | 0.9 | 89 | 295 | 0.9 | 92 | 388 | 0.7 | 73 | 461 | 0.7 | 76 | 536 | 0.7 | 78 | 614 | 0.7 | 80 | 694 | 0.7 | 83 | 777 | 0.7 | 85 | 862 |
| Huila | Jamba | Chilumbo | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 2 | 3 | 0.0 | 2 | 5 | 0.0 | 3 | 7 | 0.0 | 3 | 10 | 0.0 | 3 | 13 | 0.0 | 3 | 16 | 0.0 | 3 | 19 | 0.0 | 3 | 21 | 0.0 | 3 | 24 | 0.0 | 3 | 27 | 0.0 | 3 | 30 |
| Huila | Jamba | Dumbo | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 1 | 2 | 0.0 | 1 | 3 | 0.0 | 2 | 4 | 0.0 | 2 | 6 | 0.0 | 2 | 8 | 0.0 | 2 | 10 | 0.0 | 2 | 12 | 0.0 | 2 | 13 | 0.0 | 2 | 15 | 0.0 | 2 | 17 | 0.0 | 2 | 19 |
| Huila | Jamba | Aindongo-Cangar | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 2 | 3 | 0.0 | 2 | 5 | 0.0 | 3 | 8 | 0.0 | 3 | 11 | 0.0 | 3 | 14 | 0.0 | 3 | 17 | 0.0 | 3 | 20 | 0.0 | 3 | 23 | 0.0 | 3 | 26 | 0.0 | 3 | 29 | 0.0 | 3 | 32 |
| Huila | Chipindo | Bambi | 89.00 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 6 | 10 | 0.1 | 8 | 18 | 0.1 | 10 | 28 | 0.1 | 12 | 40 | 0.1 | 12 | 52 | 0.1 | 10 | 62 | 0.1 | 10 | 73 | 0.1 | 11 | 83 | 0.1 | 11 | 94 | 0.1 | 11 | 105 | 0.1 | 11 | 117 |
| Huila | Gambos | Tchibemba | 89.00 | 0.0 | 0 | 0 | 0.4 | 34 | 34 | 0.5 | 52 | 85 | 0.7 | 67 | 152 | 0.9 | 87 | 239 | 1.0 | 104 | 343 | 1.0 | 107 | 450 | 0.8 | 85 | 535 | 0.8 | 88 | 623 | 0.8 | 90 | 713 | 0.8 | 93 | 806 | 0.8 | 96 | 902 | 0.8 | 99 | 1,001 |
| Huila | Gambos | Nihikilo | 89.00 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 1 | 2 | 0.0 | 2 | 3 | 0.0 | 2 | 5 | 0.0 | 2 | 8 | 0.0 | 2 | 10 | 0.0 | 2 | 12 | 0.0 | 2 | 14 | 0.0 | 2 | 16 | 0.0 | 2 | 18 | 0.0 | 2 | 21 | 0.0 | 2 | 23 |
| Huila | Gambos | Viriambundo | 89.00 | 0.0 | 0 | 0 | 0.1 | 12 | 12 | 0.2 | 18 | 30 | 0.2 | 24 | 54 | 0.3 | 31 | 85 | 0.4 | 37 | 122 | 0.4 | 38 | 160 | 0.3 | 30 | 190 | 0.3 | 31 | 221 | 0.3 | 32 | 253 | 0.3 | 33 | 286 | 0.3 | 34 | 320 | 0.3 | 35 | 355 |
| Huila | Humpata | Palanca | 89.00 | 0.0 | 0 | 0 | 0.2 | 15 | 15 | 0.2 | 23 | 37 | 0.3 | 29 | 66 | 0.4 | 38 | 104 | 0.4 | 45 | 149 | 0.4 | 46 | 196 | 0.3 | 37 | 232 | 0.3 | 38 | 271 | 0.3 | 39 | 310 | 0.3 | 40 | 350 | 0.3 | 42 | 392 | 0.3 | 43 | 435 |
| Huila | Humpata | Batabata | 89.00 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 23 | 0.2 | 18 | 41 | 0.2 | 23 | 64 | 0.3 | 28 | 92 | 0.3 | 29 | 121 | 0.2 | 23 | 144 | 0.2 | 24 | 167 | 0.2 | 24 | 192 | 0.2 | 25 | 217 | 0.2 | 26 | 242 | 0.2 | 27 | 269 |
| Huila | Humpata | Kaholo | 89.00 | 0.0 | 0 | 0 | 0.5 | 49 | 49 | 0.8 | 76 | 126 | 1.0 | 98 | 224 | 1.3 | 128 | 353 | 1.5 | 153 | 506 | 1.5 | 158 | 664 | 1.1 | 126 | 789 | 1.1 | 129 | 919 | 1.1 | 133 | 1,052 | 1.1 | 137 | 1,189 | 1.1 | 141 | 1,331 | 1.1 | 146 | 1,476 |
| Huila | Humpata | Neves | 89.00 | 0.0 | 0 | 0 | 0.2 | 22 | 22 | 0.4 | 35 | 57 | 0.5 | 45 | 102 | 0.6 | 58 | 160 | 0.7 | 69 | 229 | 0.7 | 71 | 300 | 0.5 | 57 | 357 | 0.5 | 59 | 416 | 0.5 | 60 | 476 | 0.5 | 62 | 538 | 0.5 | 64 | 602 | 0.5 | 66 | 668 |
| Kuando Kubang | Menongue | Cueio | 121.62 | 0.0 | 0 | 0 | 0.0 | 5 | 5 | 0.1 | 8 | 12 | 0.1 | 10 | 22 | 0.1 | 13 | 35 | 0.1 | 15 | 50 | 0.1 | 16 | 66 | 0.1 | 12 | 78 | 0.1 | 13 | 91 | 0.1 | 13 | 104 | 0.1 | 14 | 118 | 0.1 | 14 | 132 | 0.1 | 14 | 146 |
| Kuando Kubang | Menongue | Caiundo | 121.62 | 0.0 | 0 | 0 | 0.3 | 33 | 33 | 0.4 | 51 | 83 | 0.5 | 65 | 149 | 0.6 | 85 | 234 | 0.7 | 102 | 335 | 0.7 | 105 | 440 | 0.6 | 83 | 523 | 0.6 | 86 | 609 | 0.6 | 88 | 697 | 0.6 | 91 | 788 | 0.6 | 94 | 882 | 0.6 | 97 | 979 |
| Kuando Kubang | Menongue | Missombo | 121.62 | 0.0 | 0 | 0 | 0.2 | 28 | 28 | 0.3 | 44 | 72 | 0.4 | 57 | 129 | 0.5 | 74 | 203 | 0.6 | 88 | 291 | 0.6 | 91 | 382 | 0.5 | 72 | 454 | 0.5 | 74 | 528 | 0.5 | 77 | 605 | 0.5 | 79 | 684 | 0.5 | 81 | 765 | 0.5 | 84 | 849 |
| Kuando Kubang | Cuito Canavale | Longa | 121.62 | 0.0 | 0 | 0 | 0.5 | 58 | 58 | 0.7 | 90 | 147 | 0.9 | 115 | 263 | 1.1 | 150 | 413 | 1.3 | 179 | 593 | 1.3 | 185 | 777 | 1.0 | 147 | 924 | 1.0 | 151 | 1,076 | 1.0 | 156 | 1,232 | 1.0 | 161 | 1,393 | 1.0 | 166 | 1,558 | 1.0 | 170 | 1,728 |
| Kuando Kubang | Cuito Canavale | Lupire | 121.62 | 0.0 | 0 | 0 | 0.0 | 2 | 2 | 0.0 | 3 | 5 | 0.0 | 4 | 9 | 0.0 | 5 | 14 | 0.0 | 6 | 20 | 0.0 | 6 | 26 | 0.0 | 5 | 31 | 0.0 | 5 | 36 | 0.0 | 5 | 41 | 0.0 | 5 | 47 | 0.0 | 6 | 52 | 0.0 | 6 | 58 |
| Kuando Kubang | Cuito Canavale | Baixo Longa | 121.62 | 0.0 | 0 | 0 | 0.0 | 5 | 5 | 0.1 | 8 | 13 | 0.1 | 10 | 24

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | NEW ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Kuanza Norte | Camabatela (Amba | Bindo | 105.25 | 0.0 | 0 | 0 | 0.2 | 17 | 17 | 0.2 | 26 | 42 | 0.3 | 33 | 75 | 0.4 | 43 | 118 | 0.4 | 51 | 170 | 0.4 | 53 | 223 | 0.3 | 42 | 265 | 0.3 | 43 | 308 | 0.3 | 45 | 353 | 0.3 | 46 | 399 | 0.3 | 47 | 446 | 0.3 | 49 | 495 |
| Kuanza Norte | Bolongongo | Terreiro | 105.25 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 4 | 7 | 0.0 | 5 | 12 | 0.1 | 7 | 20 | 0.1 | 8 | 28 | 0.1 | 9 | 37 | 0.1 | 7 | 44 | 0.1 | 7 | 51 | 0.1 | 7 | 58 | 0.1 | 8 | 66 | 0.1 | 8 | 74 | 0.1 | 8 | 82 |
| Kuanza Norte | Bolongongo | Quiquiemba | 105.25 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 5 | 8 | 0.1 | 6 | 14 | 0.1 | 8 | 22 | 0.1 | 10 | 32 | 0.1 | 10 | 42 | 0.1 | 8 | 50 | 0.1 | 8 | 58 | 0.1 | 8 | 67 | 0.1 | 9 | 75 | 0.1 | 9 | 84 | 0.1 | 9 | 93 |
| Kuanza Norte | Banga | Aldeia Nova | 105.25 | 0.0 | 0 | 0 | 0.1 | 7 | 7 | 0.1 | 11 | 17 | 0.1 | 14 | 31 | 0.2 | 18 | 49 | 0.2 | 21 | 70 | 0.2 | 22 | 92 | 0.1 | 17 | 109 | 0.1 | 18 | 127 | 0.1 | 18 | 146 | 0.1 | 19 | 165 | 0.1 | 20 | 185 | 0.1 | 20 | 205 |
| Kuanza Norte | Banga | Caculo Cabaça | 105.25 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 4 | 7 | 0.0 | 5 | 12 | 0.1 | 7 | 19 | 0.1 | 8 | 28 | 0.1 | 9 | 37 | 0.1 | 7 | 44 | 0.1 | 7 | 51 | 0.1 | 7 | 58 | 0.1 | 8 | 66 | 0.1 | 8 | 73 | 0.1 | 8 | 81 |
| Kuanza Norte | Samba Cajú | Samba Lucala | 105.25 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.5 | 59 | 98 | 0.7 | 76 | 174 | 0.8 | 99 | 273 | 1.0 | 119 | 392 | 1.0 | 122 | 514 | 0.8 | 97 | 611 | 0.8 | 100 | 712 | 0.8 | 103 | 815 | 0.8 | 106 | 921 | 0.8 | 109 | 1,031 | 0.8 | 113 | 1,143 |
| Kuanza Norte | Ngonguembo | Camame | 105.25 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 12 | 27 | 0.1 | 16 | 43 | 0.2 | 19 | 61 | 0.2 | 19 | 80 | 0.1 | 15 | 95 | 0.1 | 16 | 111 | 0.1 | 16 | 127 | 0.1 | 17 | 144 | 0.1 | 17 | 161 | 0.1 | 18 | 178 |
| Kuanza Norte | Ngonguembo | Cavunga | 105.25 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 2 | 4 | 0.0 | 3 | 7 | 0.0 | 4 | 10 | 0.0 | 5 | 15 | 0.0 | 5 | 20 | 0.0 | 4 | 23 | 0.0 | 4 | 27 | 0.0 | 4 | 31 | 0.0 | 4 | 35 | 0.0 | 4 | 39 | 0.0 | 4 | 44 |
| Kuanza Sul | Sumbe | Gungo | 102.99 | 0.0 | 0 | 0 | 0.3 | 33 | 33 | 0.5 | 51 | 84 | 0.6 | 65 | 149 | 0.7 | 85 | 234 | 0.9 | 102 | 336 | 0.9 | 105 | 441 | 0.7 | 83 | 524 | 0.7 | 86 | 610 | 0.7 | 89 | 699 | 0.7 | 91 | 790 | 0.7 | 94 | 884 | 0.7 | 97 | 981 |
| Kuanza Sul | Sumbe | Ngangula | 102.99 | 0.0 | 0 | 0 | 0.2 | 16 | 16 | 0.2 | 25 | 42 | 0.3 | 33 | 75 | 0.4 | 43 | 117 | 0.4 | 51 | 168 | 0.4 | 52 | 221 | 0.3 | 42 | 262 | 0.3 | 43 | 305 | 0.3 | 44 | 350 | 0.3 | 46 | 395 | 0.3 | 47 | 442 | 0.3 | 48 | 491 |
| Kuanza Sul | Sumbe | Kicombo | 102.99 | 0.0 | 0 | 0 | 0.3 | 31 | 31 | 0.4 | 47 | 78 | 0.5 | 61 | 139 | 0.7 | 79 | 218 | 0.8 | 95 | 313 | 0.8 | 98 | 410 | 0.6 | 78 | 488 | 0.6 | 80 | 568 | 0.6 | 82 | 650 | 0.6 | 85 | 735 | 0.6 | 87 | 822 | 0.6 | 90 | 912 |
| Kuanza Sul | Ambiom | Assango | 102.99 | 0.0 | 0 | 0 | 1.0 | 105 | 105 | 1.5 | 161 | 266 | 1.8 | 208 | 474 | 2.3 | 271 | 745 | 2.7 | 323 | 1,069 | 2.7 | 333 | 1,402 | 2.1 | 265 | 1,667 | 2.1 | 273 | 1,940 | 2.1 | 281 | 2,221 | 2.1 | 290 | 2,511 | 2.1 | 298 | 2,810 | 2.1 | 307 | 3,117 |
| Kuanza Sul | Quilenda | Kirimbo | 102.99 | 0.0 | 0 | 0 | 0.3 | 35 | 35 | 0.5 | 53 | 88 | 0.6 | 69 | 157 | 0.8 | 90 | 246 | 0.9 | 107 | 353 | 0.9 | 110 | 463 | 0.7 | 88 | 551 | 0.7 | 90 | 641 | 0.7 | 93 | 734 | 0.7 | 96 | 829 | 0.7 | 99 | 928 | 0.7 | 102 | 1,030 |
| Kuanza Sul | Porto Amboim | Kapolo | 102.99 | 0.0 | 0 | 0 | 0.2 | 21 | 21 | 0.3 | 33 | 54 | 0.4 | 43 | 97 | 0.5 | 56 | 153 | 0.6 | 66 | 219 | 0.6 | 68 | 287 | 0.4 | 54 | 341 | 0.4 | 56 | 397 | 0.4 | 58 | 455 | 0.4 | 59 | 514 | 0.4 | 61 | 575 | 0.4 | 63 | 638 |
| Kuanza Sul | Libolo | Munenga | 102.99 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 38 | 63 | 0.4 | 49 | 112 | 0.6 | 64 | 176 | 0.6 | 76 | 253 | 0.6 | 79 | 331 | 0.5 | 63 | 394 | 0.5 | 65 | 458 | 0.5 | 66 | 525 | 0.5 | 68 | 593 | 0.5 | 71 | 664 | 0.5 | 73 | 737 |
| Kuanza Sul | Libolo | Kabuta | 102.99 | 0.0 | 0 | 0 | 0.5 | 50 | 50 | 0.7 | 77 | 127 | 0.9 | 99 | 227 | 1.1 | 130 | 357 | 1.3 | 155 | 511 | 1.3 | 159 | 671 | 1.0 | 127 | 798 | 1.0 | 131 | 928 | 1.0 | 135 | 1,063 | 1.0 | 139 | 1,202 | 1.0 | 143 | 1,344 | 1.0 | 147 | 1,491 |
| Kuanza Sul | Libolo | Kissongo | 102.99 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 20 | 33 | 0.2 | 26 | 58 | 0.3 | 33 | 92 | 0.3 | 40 | 132 | 0.3 | 41 | 173 | 0.3 | 33 | 205 | 0.3 | 34 | 239 | 0.3 | 35 | 274 | 0.3 | 36 | 310 | 0.3 | 37 | 346 | 0.3 | 38 | 384 |
| Kuanza Sul | Quibala | Ndala Kachimbo | 102.99 | 0.0 | 0 | 0 | 0.3 | 37 | 37 | 0.5 | 57 | 94 | 0.7 | 74 | 168 | 0.8 | 96 | 264 | 1.0 | 115 | 378 | 1.0 | 118 | 496 | 0.7 | 94 | 590 | 0.7 | 97 | 687 | 0.7 | 100 | 786 | 0.7 | 103 | 889 | 0.7 | 106 | 995 | 0.7 | 109 | 1,104 |
| Kuanza Sul | Quibala | Kariango | 102.99 | 0.0 | 0 | 0 | 0.5 | 48 | 48 | 0.7 | 75 | 123 | 0.9 | 96 | 219 | 1.1 | 125 | 345 | 1.3 | 150 | 494 | 1.3 | 154 | 648 | 1.0 | 123 | 771 | 1.0 | 126 | 897 | 1.0 | 130 | 1,027 | 1.0 | 134 | 1,161 | 1.0 | 138 | 1,299 | 1.0 | 142 | 1,441 |
| Kuanza Sul | Quibala | Lonhe | 102.99 | 0.0 | 0 | 0 | 0.3 | 34 | 34 | 0.5 | 53 | 87 | 0.6 | 68 | 155 | 0.8 | 89 | 244 | 0.9 | 106 | 350 | 0.9 | 109 | 459 | 0.7 | 87 | 546 | 0.7 | 89 | 635 | 0.7 | 92 | 728 | 0.7 | 95 | 822 | 0.7 | 98 | 920 | 0.7 | 101 | 1,021 |
| Kuanza Sul | Mussende | Kienha | 102.99 | 0.0 | 0 | 0 | 0.1 | 7 | 7 | 0.1 | 11 | 19 | 0.1 | 15 | 34 | 0.2 | 19 | 53 | 0.2 | 23 | 76 | 0.2 | 24 | 100 | 0.1 | 19 | 119 | 0.1 | 19 | 138 | 0.1 | 20 | 158 | 0.1 | 21 | 179 | 0.1 | 21 | 200 | 0.1 | 22 | 222 |
| Kuanza Sul | Mussende | S. Lucas | 102.99 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.5 | 60 | 99 | 0.7 | 77 | 176 | 0.9 | 101 | 277 | 1.0 | 120 | 397 | 1.0 | 124 | 521 | 0.8 | 99 | 620 | 0.8 | 102 | 722 | 0.8 | 105 | 826 | 0.8 | 108 | 934 | 0.8 | 111 | 1,045 | 0.8 | 114 | 1,159 |
| Kuanza Sul | Seles | Amboiva | 102.99 | 0.0 | 0 | 0 | 0.9 | 95 | 95 | 1.4 | 148 | 243 | 1.7 | 190 | 433 | 2.1 | 248 | 681 | 2.5 | 296 | 976 | 2.5 | 304 | 1,281 | 1.9 | 242 | 1,523 | 1.9 | 250 | 1,773 | 1.9 | 257 | 2,030 | 1.9 | 265 | 2,294 | 1.9 | 273 | 2,567 | 1.9 | 281 | 2,848 |
| Kuanza Sul | Seles | Botera | 102.99 | 0.0 | 0 | 0 | 0.3 | 36 | 36 | 0.5 | 56 | 92 | 0.6 | 72 | 165 | 0.8 | 94 | 259 | 0.9 | 112 | 371 | 0.9 | 116 | 487 | 0.7 | 92 | 579 | 0.7 | 95 | 674 | 0.7 | 98 | 771 | 0.7 | 101 | 872 | 0.7 | 104 | 976 | 0.7 | 107 | 1,082 |
| Kuanza Sul | Conda | Cunjo | 102.99 | 0.0 | 0 | 0 | 0.8 | 87 | 87 | 1.2 | 134 | 220 | 1.5 | 172 | 392 | 1.9 | 225 | 617 | 2.2 | 268 | 885 | 2.2 | 276 | 1,160 | 1.7 | 220 | 1,380 | 1.7 | 226 | 1,606 | 1.7 | 233 | 1,839 | 1.7 | 240 | 2,079 | 1.7 | 247 | 2,326 | 1.7 | 254 | 2,580 |
| Kuanza Sul | Cassongue | Dumbi | 102.99 | 0.0 | 0 | 0 | 1.4 | 145 | 145 | 2.1 | 224 | 370 | 2.6 | 289 | 659 | 3.3 | 377 | 1,036 | 3.8 | 450 | 1,485 | 3.8 | 463 | 1,948 | 2.9 | 369 | 2,317 | 2.9 | 380 | 2,696 | 2.9 | 391 | 3,087 | 2.9 | 403 | 3,490 | 2.9 | 415 | 3,905 | 2.9 | 427 | 4,332 |
| Kuanza Sul | Cassongue | Pambangala | 102.99 | 0.0 | 0 | 0 | 1.2 | 128 | 128 | 1.8 | 197 | 325 | 2.3 | 254 | 579 | 2.9 | 331 | 910 | 3.3 | 395 | 1,305 | 3.3 | 407 | 1,712 | 2.6 | 324 | 2,036 | 2.6 | 334 | 2,370 | 2.6 | 344 | 2,714 | 2.6 | 354 | 3,068 | 2.6 | 365 | 3,432 | 2.6 | 376 | 3,808 |
| Kuanza Sul | Cassongue | Atomé | 102.99 | 0.0 | 0 | 0 | 0.5 | 51 | 51 | 0.7 | 79 | 130 | 0.9 | 101 | 231 | 1.1 | 132 | 363 | 1.3 | 158 | 521 | 1.3 | 162 | 683 | 1.0 | 129 | 813 | 1.0 | 133 | 946 | 1.0 | 137 | 1,083 | 1.0 | 141 | 1,224 | 1.0 | 146 | 1,370 | 1.0 | 150 | 1,520 |
| Kuanza Sul | Cela(Waku - Kung | Sanga | 102.99 | 0.0 | 0 | 0 | 0.5 | 50 | 50 | 0.7 | 77 | 127 | 0.9 | 99 | 226 | 1.1 | 130 | 356 | 1.3 | 155 | 510 | 1.3 | 159 | 670 | 1.0 | 127 | 796 | 1.0 | 130 | 927 | 1.0 | 134 | 1,061 | 1.0 | 138 | 1,199 | 1.0 | 143 | 1,342 | 1.0 | 147 | 1,489 |
| Kuanza Sul | Ebo | Conde | 102.99 | 0.0 | 0 | 0 | 1.3 | 140 | 140 | 2.0 | 216 | 356 | 2.5 | 279 | 635 | 3.1 | 363 | 998 | 3.6 | 433 | 1,432 | 3.6 | 446 | 1,878 | 2.8 | 355 | 2,234 | 2.8 | 366 | 2,600 | 2.8 | 377 | 2,977 | 2.8 | 388 | 3,365 | 2.8 | 400 | 3,765 | 2.8 | 412 | 4,177 |
| Kuanza Sul | Ebo | Kissange | 102.99 | 0.0 | 0 | 0 | 0.8 | 80 | 80 | 1.1 | 124 | 204 | 1.4 | 159 | 363 | 1.8 | 208 | 570 | 2.1 | 248 | 818 | 2.1 | 255 | 1,073 | 1.6 | 203 | 1,276 | 1.6 | 209 | 1,485 | 1.6 | 215 | 1,700 | 1.6 | 222 | 1,922 | 1.6 | 228 | 2,151 | 1.6 | 235 | 2,386 |
| Luanda | Kilamba Kiaxi | Havemos de Volta | 88.87 | 0.0 | 0 | 0 | 3.3 | 305 | 305 | 5.0 | 471 | 776 | 6.2 | 606 | 1,382 | 7.9 | 791 | 2,172 | 9.2 | 943 | 3,116 | 9.2 | 971 | 4,087 | 7.1 | 773 | 4,860 | 7.1 | 796 | 5,657 | 7.1 | 820 | 6,477 | 7.1 | 845 | 7,322 | 7.1 | 870 | 8,192 | 7.1 | 896 | 9,088 |
| Luanda | Samba | Benfica | 88.87 | 0.0 | 0 | 0 | 2.0 | 180 | 180 | 3.0 | 278 | 458 | 3.7 | 358 | 817 | 4.7 | 467 | 1,284 | 5.4 | 558 | 1,842 | 5.4 | 574 | 2,416 | 4.2 | 457 | 2,873 | 4.2 | 471 | 3,344 | 4.2 | 485 | 3,829 | 4.2 | 499 | 4,328 | 4.2 | 514 | 4,843 | 4.2 | 530 | 5,373 |
| Luanda | Samba | Mussulo | 88.87 | 0.0 | 0 | 0 | 0.3 | 23 | 23 | 0.4 | 36 | 59 | 0.5 | 46 | 105 | 0.6 | 60 | 166 | 0.7 | 72 | 237 | 0.7 | 74 | 311 | 0.5 | 59 | 370 | 0.5 | 61 | 431 | 0.5 | 63 | 494 | 0.5 | 64 | 558 | 0.5 | 66 | 624 | 0.5 | 68 | 693 |
| Luanda | Cacuaco | Quicolo | 88.87 | 0.0 | 0 | 0 | 1.8 | 167 | 167 | 2.7 | 258 | 426 | 3.4 | 333 | 758 | 4.3 | 434 | 1,192 | 5.0 | 518 | 1,710 | 5.0 | 533 | 2,243 | 3.9 | 424 | 2,667 | 3.9 | 437 | 3,104 | 3.9 | 450 | 3,554 | 3.9 | 464 | 4,018 | 3.9 | 478 | 4,495 | 3.9 | 492 | 4,987 |
| Luanda | Rangel | Marçal | 88.87 | 0.0 | 0 | 0 | 3.7 | 343 | 343 | 5.6 | 530 | 872 | 7.0 | 682 | 1,554 | 8.9 | 890 | 2,444 | 10.3 | 1,061 | 3,505 | 10.3 | 1,093 | 4,598 | 8.0 | 870 | 5,468 | 8.0 | 896 | 6,364 | 8.0 | 923 | 7,286 | 8.0 | 950 | 8,237 | 8.0 | 979 | 9,216 | 8.0 | 1,008 | 10,224 |
| Luanda | Sambizanga | Operário | 88.87 | 0.0 | 0 | 0 | 3.7 | 343 | 343 | 5.6 | 530 | 872 | 7.0 | 682 | 1,554 | 8.9 | 890 | 2,444 | 10.3 | 1,061 | 3,505 | 10.3 | 1,093 | 4,598 | 8.0 | 870 | 5,468 | 8.0 | 896 | 6,364 | 8.0 | 923 | 7,286 | 8.0 | 950 | 8,237 | 8.0 | 979 | 9,216 | 8.0 | 1,008 | 10,224 |
| Lunda Norte | Chitato | Lóvua | 99.59 | 0.0 | 0 | 0 | 0.3 | 28 | 28 | 0.4 | 43 | 71 | 0.5 | 56 | 127 | 0.6 | 73 | 200 | 0.8 | 87 | 287 | 0.8 | 89 | 376 | 0.6 | 71 | 447 | 0.6 | 73 | 520 | 0.6 | 75 | 596 | 0.6 | 78 | 673 | 0.6 | 80 | 753 | 0.6 | 82 | 836 |
| Lunda Norte | Lucapa | Camissombo | 99.59 | 0.0 | 0 | 0 | 0.3 | 30 | 30 | 0.4 | 46 | 76 | 0.5 | 59 | 135 | 0.7 | 77 | 212 | 0.8 | 92 | 304 | 0.8 | 95 | 399 | 0.6 | 75 | 474 | 0.6 | 78 | 552 | 0.6 | 80 | 632 | 0.6 | 82 | 715 | 0.6 | 85 | 799 | 0.6 | 87 | 887 |
| Lunda Norte | Lucapa | Capaia | 99.59 | 0.0 | 0 | 0 | 0.2 | 17 | 17 | 0.3 | 27 | 45 | 0.3 | 35 | 79 | 0.4 | 45 | 125 | 0.5 | 54 | 179 | 0.5 | 56 | 235 | 0.4 | 44 | 279 | 0.4 | 46 | 325 | 0.4 | 47 | 372 | 0.4 | 48 | 420 | 0.4 | 50 | 470 | 0.4 | 51 | 522 |
| Lunda Norte | Lucapa | Xa-cassau | 99.59 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.6 | 58 | 96 | 0.7 | 75 | 171 | 0.9 | 98 | 269 | 1.0 | 117 | 385 | 1.0 | 120 | 506 | 0.8 | 96 | 601 | 0.8 | 99 | 700 | 0.8 | 101 | 801 | 0.8 | 105 | 906 | 0.8 | 108 | 1,014 | 0.8 | 111 | 1,125 |
| Lunda Norte | Cambulo | Canzar | 99.59 | 0.0 | 0 | 0 | 0.1 | 11 | 11 | 0.2 | 18 | 29 | 0.2 | 23 | 52 | 0.3 | 30 | 81 | 0.3 | 35 | 116 | 0.3 | 36 | 153 | 0.2 | 29 | 181 | 0.2 | 30 | 211 | 0.2 | 31 | 242 | 0.2 | 32 | 273 | 0.2 | 32 | 306 | 0.2 | 33 | 339 |
| Lunda Norte | Cambulo | Cachimo | 99.59 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 5 | 8 | 0.1 | 6 | 15 | 0.1 | 8 | 23 | 0.1 | 10 | 33 | 0.1 | 10 | 44 | 0.1 | 8 | 52 | 0.1 | 8 | 60 | 0.1 | 9 | 69 | 0.1 | 9 | 78 | 0.1 | 9 | 87 | 0.1 | 10 | 97 |
| Lunda Norte | Cambulo | Luia | 99.59 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.2 | 17 | 38 | 0.2 | 22 | 60 | 0.2 | 26 | 86 | 0.2 | 27 | 113 | 0.2 | 21 | 135 | 0.2 | 22 | 157 | 0.2 | 23 | 179 | 0.2 | 23 | 203 | 0.2 | 24 | 227 | 0.2 | 25 | 252 |
| Lunda Norte | Cuilo | Caluango | 99.59 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 37 | 61 | 0.4 | 48 | 109 | 0.6 | 62 | 171 | 0.6 | 74 | 245 | 0.6 | 76 | 321 | 0.5 | 61 | 382 | 0.5 | 63 | 445 | 0.5 | 64 | 509 | 0.5 | 66 | 576 | 0.5 | 68 | 644 | 0.5 | 70 | 715 |
| Lunda Norte | Caungula | Camaxilo | 99.59 | 0.0 | 0 | 0 | 0.3 | 33 | 33 | 0.5 | 51 | 84 | 0.6 | 66 | 150 | 0.8 | 86 | 235 | 0.9 | 102 | 338 | 0.9 | 105 | 443 | 0.7 | 84 | 527 | 0.7 | 86 | 613 | 0.7 | 89 | 702 | 0.7 | 92 | 793 | 0.7 | 94 | 888 | 0.7 | 97 | 985 |
| Lunda Norte | Cuango | Cuango | 99.59 | 0.0 | 0 | 0 | 3.6 | 373 | 373 | 5.5 | 577 | 950 | 6.8 | 743 | 1,693 | 8.6 | 969 | 2,662 | 10.0 | 1,155 | 3,817 | 10.0 | 1,190 | 5,007 | 7.7 | 947 | 5,954 | 7.7 | 976 | 6,930 | 7.7 | 1,005 | 7,935 | 7.7 | 1,035 | 8,970 | 7.7 | 1,066 | 10,036 | 7.7 | 1,098 | 11,134 |
| Lunda Norte | Cuango | Luremo | 99.59 | 0.0 | 0 | 0 | 0.6 | 65 | 65 | 0.9 | 100 | 164 | 1.2 | 128 | 293 | 1.5 | 168 | 460 | 1.7 | 200 | 660 | 1.7 | 206 | 866 | 1.3 | 164 | 1,030 | 1.3 | 169 | 1,199 | 1.3 | 174 | 1,373 | 1.3 | 179 | 1,552 | 1.3 | 184 | 1,736 | 1.3 | 190 | 1,926 |
| Lunda Norte | Lubalo | Muvulage | 99.59 | 0.0 | 0 | 0 | 0.2 | 21 | 21 | 0.3 | 33 | 55 | 0.4 | 43 | 97 | 0.5 | 56 | 153 | 0.6 | 66 | 219 | 0.6 | 68 | 288 | 0.4 | 54 | 342 | 0.4 | 56 | 398 | 0.4 | 58 | 456 | 0.4 | 59 | 515 | 0.4 | 61 | 577 | 0.4 | 63 | 640 |
| Lunda Norte | Lubalo | Luangue | 99.59 | 0.0 | 0 | 0 | 0.2 | 21 | 21 | 0.3 | 33 | 54 | 0.4 | 43 | 97 | 0.5 | 55 | 152 | 0.6 | 66 | 219 | 0.6 | 68 | 287 | 0.4 | 54 | 341 | 0.4 | 56 | 397 | 0.4 | 58 | 454 | 0.4 | 59 | 514 | 0.4 | 61 | 575 | 0.4 | 63 | 637 |
| Lunda Norte | Capenda-Camulen | Xinge | 99.59 | 0.0 | 0 | 0 | 0.6 | 64 | 64 | 0.9 | 99 | 163 | 1.2 | 127 | 290 | 1.5 | 166 | 456 | 1.7 | 198 | 655 | 1.7 | 204 | 859 | 1.3 | 162 | 1,021 | 1.3 | 167 | 1,189 | 1.3 | 172 | 1,361 | 1.3 | 178 | 1,538 | 1.3 | 183 | 1,721 | 1.3 | 188 | 1,910 |
| Lunda Norte | Xá-muteba | Longo | 99.59 | 0.0 | 0 | 0 | 0.6 | 58 | 58 | 0.8 | 90 | 148 | 1.1 | 115 | 263 | 1.3 | 151 | 414 | 1.6 | 180 | 593 | 1.6 | 185 | 778 | 1.2 | 147 | 925 | 1.2 | 152 | 1,077 | 1.2 | 156 | 1,233 | 1.2 | 161 | 1,394 | 1.2 | 166 | 1,560 | 1.2 | 171 | 1,730 |
| Lunda Norte | Xá-muteba | Cassage-Calucala | 99.59 | 0.0 | 0 | 0 | 0.6 | 62 | 62 | 0.9 | 96 | 158 | 1.1 | 124 | 282 | 1.4 | 162 | 444 | 1.7 | 193 | 637 | 1.7 | 198 | 835 | 1.3 | 158 | 993 | 1.3 | 163 | 1,156 | 1.3 | 168 | 1,323 | 1.3 | 173 | 1,496 | 1.3 | 178 | 1,674 | 1.3 | 183 | 1,857 |
| Lunda Sul (2) | Saurimo | Mona Quimbundo | 122.40 | 0.0 | 0 | 0 | 0.7 | 83 | 83 | 1.4 | 179 | 262 | 1.6 | 211 | 472 | 1.2 | 172 | 644 | 0.7 | 93 | 737 | 0.2 | 34 | 771 | 0.1 | 21 | 792 | 0.1 | 21 | 813 | 0.1 | 22 | 835 | 0.1 | 22 | 857 | 0.1 | 23 | 880 | 0.1 | 24 | 904 |
| Lunda Sul (2) | Saurimo | Sombo | 122.40 | 0.0 | 0 | 0 | 0.7 | 85 | 85 | 1.4 | 184 | 270 | 1.6 | 217 | 487 | 1.3 | 177 | 664 | 0.7 | 96 | 760 | 0.2 | 35 | 794 | 0.1 | 21 | 815 | 0.1 | 22 | 837 | 0.1 | 22 | 860 | 0.1 | 23 | 883 | 0.1 | 24 | 907 | 0.1 | 25 | 931 |
| Lunda Sul (2) | Muconda | Cassai | 122.40 | 0.0 | 0 | 0 | 1.0 | 128 | 128 | 2.1 | 276 | 404 | 2.4 | 325 | 730 | 1.9 | 265 | 995 | 1.0 | 144 | 1,139 | 0.4 | 52 | 1,191 | 0.2 | 32 | 1,222 | 0.2 | 33 | 1,255 | 0.2 | 34 | 1,289 | 0.2 | 35 | 1,324 | 0.2 | 36 | 1,359 | 0.2 | 37 | 1,396 |
| Lunda Sul (2) | Muconda | Chiluange | 122.40 | 0.0 | 0 | 0 | 2.3 | 288 | 288 | 4.8 | 624 | 912 | 5.5 | 734 | 1,646 | 4.3 | 599 | 2,244 | 2.3 | 324 | 2,569 | 0.8 | 117 | 2,686 | 0.5 | 72 | 2,757 | 0.5 | 74 | 2,831 | 0.5 | 76 | 2,907 | 0.5 | 78 | 2,986 | 0.5 | 81 | 3,066 | 0.5 | 83 | 3,150 |
| Lunda Sul (2) | Muconda | Muriege | 122.40 | 0.0 | 0 | 0 | 1.9 | 240 | 240 | 4.0 | 518 | 758 | 4.6 | 610 | 1,368 | 3.6 | 497 | 1,865 | 1.9 | 270 | 2,135 | 0.7 | 97 | 2,232 | 0.4 | 60 | 2,292 | 0.4 | 61 | 2,353 | 0.4 | 63 | 2,416 | 0.4 | 65 | 2,482 | 0.4 | 67 | 2,549 | 0.4 | 69 | 2,618 |
| Lunda Sul (2) | Dala | Cazage | 122.40 | 0.0 | 0 | 0 | 1.7 | 216 | 216 | 3.6 | 467 | 682 | 4.1 | 549 | 1,232 | 3.3 | 448 | 1,680 | 1.7 | 243 | 1,922 | 0.6 | 88 | 2,010 | 0.4 | 54 | 2,064 | 0.4 | 55 | 2,119 | 0.4 | 57 | 2,176 | 0.4 | 59 | 2,234 | 0.4 | 60 | 2,295 | 0.4 | 62 | 2,357 |
| Lunda Sul (2) | Dala | Luma Cassai | 122.40 | 0.0 | 0 | 0 | 1.8 | 230 | 230 | 3.8 | 497 | 727 | 4.4 | 585 | 1,312 | 3.5 | 477 | 1,789 | 1.8 | 259 | 2,047 | 0.6 | 93 | 2,141 | 0.4 | 57 | 2,198 | 0.4 | 59 | 2,257 | 0.4 | 61 | 2,317 | 0.4 | 62 | 2,380 | 0.4 | 64 | 2,444 | 0.4 | 66 | 2,510 |
| Lunda Sul (2) | Cacolo | Alto - Chicapa | 122.40 | 0.0 | 0 | 0 | 1.2 | 156 | 156 | 2.6 | 338 | 494 | 3.0 | 397 | 891 | 2.4 | 324 | 1,215 | 1.2 | 176 | 1,391 | 0.4 | 63 | 1,454 | 0.3 | 39 | 1,493 | 0.3 | 40 | 1,533 | 0.3 | 41 | 1,574 | 0.3 | 42 | 1,616 | 0.3 | 44 | 1,660 | 0.3 | 45 | 1,705 |
| Lunda Sul (2) | Cacolo | Cucumbi | 122.40 | 0.0 | 0 | 0 | 1.1 | 139 | 139 | 2.3 | 301 | 440 | 2.6 | 354 | 794 | 2.1 | 289 | 1,083 | 1.1 | 156 | 1,239 | 0.4 | 56 | 1,295 | 0.2 | 35 | 1,330 | 0.2 | 36 | 1,366 | 0.2 | 37 | 1,402 | 0.2 | 38 | 1,440 | 0.2 | 39 | 1,479 | 0.2 | 40 | 1,519 |
| Lunda Sul (2) | Cacolo | Xassengue | 122.40 | 0.0 | 0 | 0 | 1.0 | 121 | 121 | 2.0 | 261 | 382 | 2.3 | 307 | 689 | 1.8 | 250 | 939 | 1.0 | 136 | 1,075 | 0.3 | 49 | 1,124 | 0.2 | 30 | 1,154 | 0.2 | 31 | 1,185 | 0.2 | 32 | 1,216 | 0.2 | 33 | 1,249 | 0.2 | 34 | 1,283 | 0.2 | 35 | 1,318 |
| Malanje | Malanje | Cambaxe | 96.72 | 0.0 | 0 | 0 | 0.2 | 23 | 23 | 0.3 | 35 | 57 | 0.4 | 45 | 102 | 0.5 | 58 | 161 | 0.6 | 70 | 230 | 0.6 | 72 | 302 | 0.5 | 57 | 359 | 0.5 | 59 | 418 | 0.5 | 61 | 479 | 0.5 | 62 | 541 | 0.5 | 64 | 606 | 0.5 | 66 | 672 |
| Malanje | Malanje | Ngola - Luige | 96.72 | 0.0 | 0 | 0 | 0.3 | 28 | 28 | 0.4 | 43 | 71 | 0.5 | 55 | 126 | 0.7 | 72 | 198 | 0.8 | 86 | 284 | 0.8 | 89 | 373 | 0.6 | 70 | 443 | 0.6 | 73 | 516 | 0.6 | 75 | 590 | 0.6 | 77 | 667 | 0.6 | 79 | 747 | 0.6 | 82 | 828 |
| Malanje | Cacuso | Pungo - Andongo | 96.72 | 0.0 | 0 | 0 | 0.3 | 27 | 27 | 0.4 | 42 | 70 | 0.5 | 55 | 124 | 0.7 | 71 | 196 | 0.8 | 85 | 280 | 0.8 | 87 | 368 | 0.6 | 70 | 437 | 0.6 | 72 | 509 | 0.6 | 74 | 583 | 0.6 | 76 | 659 | 0.6 | 78 | 737 | 0.6 | 81 | 818 |
| Malanje | Cacuso | Lombe | 96.72 | 0.0 | 0 | 0 | 0.3 | 27 | 27 | 0.4 | 42 | 69 | 0.5 | 54 | 122 | 0.6 | 70 | 193 | 0.7 | 84 | 276 | 0.7 | 86 | 362 | 0.6 | 69 | 431 | 0.6 | 71 | 501 | 0.6 | 73 | 574 | 0.6 | 75 | 649 | 0.6 | 77 | 726 | 0.6 | 79 | 805 |
| Malanje | Cacuso | Kizenga | 96.72 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.7 | 67 | 110 | 0.8 | 86 | 197 | 1.0 | 113 | 309 | 1.2 | 134 | 443 | 1.2 | 138 | 582 | 0.9 | 110 | 692 | 0.9 | 113 | 805 | 0.9 | 117 | 922 | 0.9 | 120 | 1,042 | 0.9 | 124 | 1,166 | 0.9 | 128 | 1,293 |
| Malanje | Cacuso | Soqueco | 96.72 | 0.0 | 0 | 0 | 0.3 | 25 | 25 | 0.4 | 39 | 64 | 0.5 | 50 | 114 | 0.6 | 65 | 180 | 0.7 | 78 | 258 | 0.7 | 80 | 338 | 0.5 | 64 | 403 | 0.5 | 66 | 468 | 0.5 | 68 | 536 | 0.5 | 70 | 606 | 0.5 | 72 | 678 | 0.5 | 74 | 753 |
| Malanje | Calandula | Kateco-Kangola | 96.72 | 0.0 | 0 | 0 | 0.3 | 25 | 25 | 0.4 | 39 | 64 | 0.5 | 50 | 113 | 0.6 | 65 | 178 | 0.7 | 77 | 256 | 0.7 | 80 | 336 | 0.5 | 63 | 399 | 0.5 | 65 | 464 | 0.5 | 67 | 532 | 0.5 | 69 | 601 | 0.5 | 71 | 673 | 0.5 | 74 | 746 |
|

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | NEW ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Malanje | Cagandala | Mbembo | 96.72 | 0.0 | 0 | 0 | 0.2 | 17 | 17 | 0.3 | 26 | 43 | 0.3 | 34 | 77 | 0.4 | 44 | 122 | 0.5 | 53 | 175 | 0.5 | 54 | 229 | 0.4 | 43 | 272 | 0.4 | 45 | 317 | 0.4 | 46 | 363 | 0.4 | 47 | 410 | 0.4 | 49 | 459 | 0.4 | 50 | 509 |
| Malanje | Cagandala | Kulamagia | 96.72 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.6 | 60 | 99 | 0.7 | 77 | 176 | 0.9 | 101 | 277 | 1.1 | 120 | 397 | 1.1 | 124 | 521 | 0.8 | 99 | 620 | 0.8 | 102 | 721 | 0.8 | 105 | 826 | 0.8 | 108 | 934 | 0.8 | 111 | 1,045 | 0.8 | 114 | 1,159 |
| Malanje | Kiwaba-Ngozi | Mufuma | 96.72 | 0.0 | 0 | 0 | 0.4 | 35 | 35 | 0.5 | 55 | 90 | 0.7 | 70 | 160 | 0.8 | 92 | 252 | 1.0 | 110 | 362 | 1.0 | 113 | 475 | 0.8 | 90 | 564 | 0.8 | 92 | 657 | 0.8 | 95 | 752 | 0.8 | 98 | 850 | 0.8 | 101 | 951 | 0.8 | 104 | 1,055 |
| Moxico | Moxico | Cagumbe/Kachipe | 105.17 | 0.0 | 0 | 0 | 0.3 | 36 | 36 | 0.5 | 56 | 92 | 0.6 | 72 | 163 | 0.8 | 94 | 257 | 0.9 | 112 | 368 | 0.9 | 115 | 483 | 0.7 | 91 | 575 | 0.7 | 94 | 669 | 0.7 | 97 | 766 | 0.7 | 100 | 866 | 0.7 | 103 | 969 | 0.7 | 106 | 1,075 |
| Moxico | Moxico | Lucusse | 105.17 | 0.0 | 0 | 0 | 0.1 | 12 | 12 | 0.2 | 19 | 31 | 0.2 | 25 | 56 | 0.3 | 32 | 88 | 0.3 | 38 | 126 | 0.3 | 39 | 165 | 0.2 | 31 | 196 | 0.2 | 32 | 229 | 0.2 | 33 | 262 | 0.2 | 34 | 296 | 0.2 | 35 | 331 | 0.2 | 36 | 367 |
| Moxico | Léua | Liangongo (Sando | 105.17 | 0.0 | 0 | 0 | 0.2 | 27 | 27 | 0.4 | 41 | 68 | 0.5 | 53 | 121 | 0.6 | 69 | 190 | 0.7 | 83 | 273 | 0.7 | 85 | 358 | 0.5 | 68 | 426 | 0.5 | 70 | 496 | 0.5 | 72 | 568 | 0.5 | 74 | 642 | 0.5 | 76 | 718 | 0.5 | 79 | 797 |
| Moxico | Luacano | Lago - Dilolo | 105.17 | 0.0 | 0 | 0 | 0.1 | 14 | 14 | 0.2 | 21 | 35 | 0.2 | 27 | 62 | 0.3 | 35 | 97 | 0.3 | 42 | 139 | 0.3 | 43 | 182 | 0.3 | 34 | 217 | 0.3 | 35 | 252 | 0.3 | 37 | 289 | 0.3 | 38 | 326 | 0.3 | 39 | 365 | 0.3 | 40 | 405 |
| Moxico | Lumbala-Nguimbo | Chiume | 105.17 | 0.0 | 0 | 0 | 0.1 | 14 | 14 | 0.2 | 21 | 35 | 0.2 | 28 | 63 | 0.3 | 36 | 99 | 0.4 | 43 | 142 | 0.4 | 44 | 186 | 0.3 | 35 | 221 | 0.3 | 36 | 257 | 0.3 | 37 | 295 | 0.3 | 38 | 333 | 0.3 | 40 | 373 | 0.3 | 41 | 413 |
| Moxico | Lumbala-Nguimbo | Lutembo | 105.17 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 24 | 0.2 | 19 | 42 | 0.2 | 24 | 66 | 0.2 | 29 | 95 | 0.2 | 30 | 125 | 0.2 | 24 | 148 | 0.2 | 24 | 173 | 0.2 | 25 | 198 | 0.2 | 26 | 223 | 0.2 | 27 | 250 | 0.2 | 27 | 277 |
| Moxico | Lumbala-Nguimbo | Mussuma | 105.17 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.1 | 16 | 26 | 0.2 | 20 | 45 | 0.2 | 26 | 72 | 0.3 | 31 | 103 | 0.3 | 32 | 135 | 0.2 | 25 | 160 | 0.2 | 26 | 186 | 0.2 | 27 | 213 | 0.2 | 28 | 241 | 0.2 | 29 | 270 | 0.2 | 30 | 299 |
| Moxico | Lumbala-Nguimbo | Ninda | 105.17 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 6 | 10 | 0.1 | 8 | 18 | 0.1 | 10 | 28 | 0.1 | 12 | 41 | 0.1 | 13 | 53 | 0.1 | 10 | 63 | 0.1 | 10 | 74 | 0.1 | 11 | 84 | 0.1 | 11 | 95 | 0.1 | 11 | 107 | 0.1 | 12 | 119 |
| Moxico | Lumbala-Nguimbo | Sessa | 105.17 | 0.0 | 0 | 0 | 0.0 | 1 | 1 | 0.0 | 2 | 2 | 0.0 | 2 | 4 | 0.0 | 3 | 7 | 0.0 | 3 | 10 | 0.0 | 3 | 13 | 0.0 | 2 | 16 | 0.0 | 3 | 18 | 0.0 | 3 | 21 | 0.0 | 3 | 23 | 0.0 | 3 | 26 | 0.0 | 3 | 29 |
| Moxico | Lumbala-Nguimbo | Luvuei | 105.17 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 4 | 7 | 0.0 | 5 | 12 | 0.1 | 7 | 19 | 0.1 | 8 | 27 | 0.1 | 8 | 35 | 0.1 | 7 | 41 | 0.1 | 7 | 48 | 0.1 | 7 | 55 | 0.1 | 7 | 62 | 0.1 | 7 | 70 | 0.1 | 8 | 77 |
| Moxico | Luchazes | Cangombe | 105.17 | 0.0 | 0 | 0 | 0.3 | 33 | 33 | 0.5 | 51 | 84 | 0.6 | 66 | 150 | 0.7 | 86 | 237 | 0.8 | 103 | 339 | 0.8 | 106 | 445 | 0.7 | 84 | 529 | 0.7 | 87 | 616 | 0.7 | 89 | 705 | 0.7 | 92 | 797 | 0.7 | 95 | 892 | 0.7 | 98 | 990 |
| Moxico | Luchazes | Tempue | 105.17 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.3 | 38 | 62 | 0.4 | 49 | 111 | 0.5 | 64 | 175 | 0.6 | 76 | 250 | 0.6 | 78 | 328 | 0.5 | 62 | 391 | 0.5 | 64 | 455 | 0.5 | 66 | 520 | 0.5 | 68 | 588 | 0.5 | 70 | 658 | 0.5 | 72 | 730 |
| Moxico | Luchazes | Cassamba | 105.17 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 23 | 0.2 | 18 | 41 | 0.2 | 23 | 64 | 0.2 | 28 | 92 | 0.2 | 29 | 121 | 0.2 | 23 | 144 | 0.2 | 24 | 168 | 0.2 | 24 | 192 | 0.2 | 25 | 217 | 0.2 | 26 | 243 | 0.2 | 27 | 270 |
| Moxico | Luchazes | Muie | 105.17 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 24 | 0.2 | 18 | 42 | 0.2 | 24 | 66 | 0.2 | 29 | 95 | 0.2 | 29 | 124 | 0.2 | 23 | 148 | 0.2 | 24 | 172 | 0.2 | 25 | 197 | 0.2 | 26 | 222 | 0.2 | 26 | 249 | 0.2 | 27 | 276 |
| Moxico | Alto Zambeze | Caianda | 105.17 | 0.0 | 0 | 0 | 0.2 | 16 | 16 | 0.2 | 25 | 42 | 0.3 | 33 | 75 | 0.4 | 43 | 118 | 0.4 | 51 | 169 | 0.4 | 53 | 221 | 0.3 | 42 | 263 | 0.3 | 43 | 306 | 0.3 | 44 | 351 | 0.3 | 46 | 396 | 0.3 | 47 | 443 | 0.3 | 49 | 492 |
| Moxico | Alto Zambeze | Calunda | 105.17 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 12 | 27 | 0.1 | 16 | 43 | 0.2 | 19 | 62 | 0.2 | 19 | 81 | 0.1 | 15 | 96 | 0.1 | 16 | 112 | 0.1 | 16 | 128 | 0.1 | 17 | 145 | 0.1 | 17 | 162 | 0.1 | 18 | 180 |
| Moxico | Alto Zambeze | Lóvua | 105.17 | 0.0 | 0 | 0 | 0.0 | 5 | 5 | 0.1 | 8 | 12 | 0.1 | 10 | 22 | 0.1 | 13 | 35 | 0.1 | 15 | 50 | 0.1 | 16 | 65 | 0.1 | 12 | 78 | 0.1 | 13 | 90 | 0.1 | 13 | 103 | 0.1 | 13 | 117 | 0.1 | 14 | 131 | 0.1 | 14 | 145 |
| Moxico | Alto Zambeze | Kaquemgue | 105.17 | 0.0 | 0 | 0 | 0.3 | 29 | 29 | 0.4 | 45 | 74 | 0.5 | 58 | 132 | 0.6 | 76 | 208 | 0.7 | 90 | 298 | 0.7 | 93 | 391 | 0.6 | 74 | 464 | 0.6 | 76 | 541 | 0.6 | 78 | 619 | 0.6 | 81 | 700 | 0.6 | 83 | 783 | 0.6 | 86 | 868 |
| Moxico | Alto Zambeze | Mucondo | 105.17 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 14 | 24 | 0.2 | 19 | 42 | 0.2 | 24 | 67 | 0.2 | 29 | 96 | 0.2 | 30 | 126 | 0.2 | 24 | 149 | 0.2 | 24 | 174 | 0.2 | 25 | 199 | 0.2 | 26 | 225 | 0.2 | 27 | 252 | 0.2 | 28 | 279 |
| Moxico | Alto Zambeze | Kavungo | 105.17 | 0.0 | 0 | 0 | 0.3 | 32 | 32 | 0.4 | 49 | 81 | 0.6 | 64 | 145 | 0.7 | 83 | 228 | 0.8 | 99 | 327 | 0.8 | 102 | 429 | 0.6 | 81 | 511 | 0.6 | 84 | 594 | 0.6 | 86 | 681 | 0.6 | 89 | 769 | 0.6 | 91 | 861 | 0.6 | 94 | 955 |
| Namibe | Namibe | Lucira | 88.87 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 10 | 16 | 0.1 | 13 | 29 | 0.2 | 17 | 46 | 0.2 | 20 | 66 | 0.2 | 21 | 86 | 0.1 | 16 | 103 | 0.1 | 17 | 120 | 0.1 | 17 | 137 | 0.1 | 18 | 155 | 0.1 | 18 | 173 | 0.1 | 19 | 192 |
| Namibe | Namibe | Bentiaba | 88.87 | 0.0 | 0 | 0 | 0.2 | 16 | 16 | 0.3 | 25 | 41 | 0.3 | 32 | 72 | 0.4 | 41 | 114 | 0.5 | 49 | 163 | 0.5 | 51 | 214 | 0.4 | 41 | 255 | 0.4 | 42 | 297 | 0.4 | 43 | 340 | 0.4 | 44 | 384 | 0.4 | 46 | 430 | 0.4 | 47 | 477 |
| Namibe | Tômbua | Baía dos Tigres | 88.87 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 |
| Namibe | Virei | Cainde | 88.87 | 0.0 | 0 | 0 | 0.5 | 48 | 48 | 0.8 | 75 | 123 | 1.0 | 96 | 219 | 1.3 | 125 | 345 | 1.5 | 150 | 494 | 1.5 | 154 | 648 | 1.1 | 123 | 771 | 1.1 | 126 | 897 | 1.1 | 130 | 1,027 | 1.1 | 134 | 1,161 | 1.1 | 138 | 1,299 | 1.1 | 142 | 1,442 |
| Namibe | Bibala | Caitou | 88.87 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 12 | 19 | 0.2 | 15 | 34 | 0.2 | 20 | 54 | 0.2 | 23 | 77 | 0.2 | 24 | 101 | 0.2 | 19 | 121 | 0.2 | 20 | 140 | 0.2 | 20 | 161 | 0.2 | 21 | 182 | 0.2 | 22 | 203 | 0.2 | 22 | 226 |
| Namibe | Bibala | Lola | 88.87 | 0.0 | 0 | 0 | 0.2 | 15 | 15 | 0.2 | 23 | 38 | 0.3 | 30 | 68 | 0.4 | 39 | 107 | 0.5 | 47 | 154 | 0.5 | 48 | 202 | 0.3 | 38 | 240 | 0.3 | 39 | 279 | 0.3 | 40 | 320 | 0.3 | 42 | 361 | 0.3 | 43 | 404 | 0.3 | 44 | 449 |
| Namibe | Bibala | Kapangombe | 88.87 | 0.0 | 0 | 0 | 0.1 | 13 | 13 | 0.2 | 20 | 33 | 0.3 | 26 | 59 | 0.3 | 34 | 93 | 0.4 | 40 | 133 | 0.4 | 42 | 175 | 0.3 | 33 | 208 | 0.3 | 34 | 242 | 0.3 | 35 | 277 | 0.3 | 36 | 313 | 0.3 | 37 | 351 | 0.3 | 38 | 389 |
| Namibe | Camucuio | Mámue | 88.87 | 0.0 | 0 | 0 | 0.1 | 7 | 7 | 0.1 | 11 | 17 | 0.1 | 14 | 31 | 0.2 | 18 | 49 | 0.2 | 21 | 70 | 0.2 | 22 | 92 | 0.2 | 17 | 109 | 0.2 | 18 | 127 | 0.2 | 18 | 146 | 0.2 | 19 | 165 | 0.2 | 20 | 184 | 0.2 | 20 | 204 |
| Namibe | Camucuio | Chingo | 88.87 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 4 | 7 | 0.1 | 5 | 12 | 0.1 | 7 | 19 | 0.1 | 8 | 27 | 0.1 | 9 | 36 | 0.1 | 7 | 43 | 0.1 | 7 | 50 | 0.1 | 7 | 57 | 0.1 | 7 | 64 | 0.1 | 8 | 72 | 0.1 | 8 | 80 |
| Uige (2) | Ambuíla | Quipedro | 118.66 | 0.0 | 0 | 0 | 0.2 | 29 | 29 | 0.5 | 63 | 92 | 0.6 | 74 | 167 | 0.5 | 61 | 228 | 0.2 | 33 | 260 | 0.1 | 12 | 272 | 0.0 | 7 | 280 | 0.0 | 7 | 287 | 0.0 | 8 | 295 | 0.0 | 8 | 303 | 0.0 | 8 | 311 | 0.0 | 8 | 319 |
| Uige (2) | Songo | Kinvuenga | 118.66 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 51 | 75 | 0.5 | 60 | 135 | 0.4 | 49 | 184 | 0.2 | 27 | 210 | 0.1 | 10 | 220 | 0.0 | 6 | 226 | 0.0 | 6 | 232 | 0.0 | 6 | 238 | 0.0 | 6 | 244 | 0.0 | 7 | 251 | 0.0 | 7 | 258 |
| Uige (2) | Bembe | Lucunga | 118.66 | 0.0 | 0 | 0 | 0.6 | 73 | 73 | 1.3 | 158 | 231 | 1.4 | 186 | 417 | 1.1 | 151 | 568 | 0.6 | 82 | 650 | 0.2 | 30 | 680 | 0.1 | 18 | 698 | 0.1 | 19 | 717 | 0.1 | 19 | 736 | 0.1 | 20 | 756 | 0.1 | 20 | 776 | 0.1 | 21 | 797 |
| Uige (2) | Bembe | Mabaia | 118.66 | 0.0 | 0 | 0 | 0.3 | 37 | 37 | 0.6 | 80 | 116 | 0.7 | 94 | 210 | 0.6 | 76 | 286 | 0.3 | 41 | 328 | 0.1 | 15 | 343 | 0.1 | 9 | 352 | 0.1 | 9 | 361 | 0.1 | 10 | 371 | 0.1 | 10 | 381 | 0.1 | 10 | 391 | 0.1 | 11 | 402 |
| Uige (2) | Negage | Dimuca | 118.66 | 0.0 | 0 | 0 | 0.8 | 98 | 98 | 1.7 | 212 | 310 | 1.9 | 250 | 560 | 1.5 | 204 | 764 | 0.8 | 110 | 874 | 0.3 | 40 | 914 | 0.2 | 24 | 938 | 0.2 | 25 | 963 | 0.2 | 26 | 989 | 0.2 | 27 | 1,016 | 0.2 | 27 | 1,043 | 0.2 | 28 | 1,072 |
| Uige (2) | Negage | Quisseque | 118.66 | 0.0 | 0 | 0 | 0.5 | 64 | 64 | 1.1 | 139 | 203 | 1.3 | 163 | 366 | 1.0 | 133 | 500 | 0.5 | 72 | 572 | 0.2 | 26 | 598 | 0.1 | 16 | 614 | 0.1 | 16 | 630 | 0.1 | 17 | 647 | 0.1 | 17 | 665 | 0.1 | 18 | 683 | 0.1 | 19 | 701 |
| Uige (2) | Maquela do Zombo | Beu | 118.66 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.2 | 20 | 29 | 0.2 | 24 | 53 | 0.1 | 19 | 72 | 0.1 | 10 | 83 | 0.0 | 4 | 87 | 0.0 | 2 | 89 | 0.0 | 2 | 91 | 0.0 | 2 | 94 | 0.0 | 3 | 96 | 0.0 | 3 | 99 | 0.0 | 3 | 102 |
| Uige (2) | Maquela do Zombo | Cuilo Futa | 118.66 | 0.0 | 0 | 0 | 0.1 | 11 | 11 | 0.2 | 24 | 35 | 0.2 | 28 | 64 | 0.2 | 23 | 87 | 0.1 | 13 | 100 | 0.0 | 5 | 104 | 0.0 | 3 | 107 | 0.0 | 3 | 110 | 0.0 | 3 | 113 | 0.0 | 3 | 116 | 0.0 | 3 | 119 | 0.0 | 3 | 122 |
| Uige (2) | Maquela do Zombo | Sacandica | 118.66 | 0.0 | 0 | 0 | 0.1 | 11 | 11 | 0.2 | 23 | 33 | 0.2 | 27 | 60 | 0.2 | 22 | 82 | 0.1 | 12 | 94 | 0.0 | 4 | 98 | 0.0 | 3 | 101 | 0.0 | 3 | 104 | 0.0 | 3 | 106 | 0.0 | 3 | 109 | 0.0 | 3 | 112 | 0.0 | 3 | 115 |
| Uige (2) | Damba | Lombe | 118.66 | 0.0 | 0 | 0 | 1.0 | 121 | 121 | 2.1 | 262 | 383 | 2.4 | 308 | 690 | 1.9 | 251 | 941 | 1.0 | 136 | 1,078 | 0.3 | 49 | 1,127 | 0.2 | 30 | 1,157 | 0.2 | 31 | 1,188 | 0.2 | 32 | 1,220 | 0.2 | 33 | 1,253 | 0.2 | 34 | 1,286 | 0.2 | 35 | 1,321 |
| Uige (2) | Damba | Lemboa | 118.66 | 0.0 | 0 | 0 | 1.1 | 138 | 138 | 2.4 | 298 | 436 | 2.7 | 351 | 787 | 2.1 | 286 | 1,073 | 1.1 | 155 | 1,228 | 0.4 | 56 | 1,284 | 0.2 | 34 | 1,319 | 0.2 | 35 | 1,354 | 0.2 | 36 | 1,390 | 0.2 | 37 | 1,428 | 0.2 | 39 | 1,466 | 0.2 | 40 | 1,506 |
| Uige (2) | Damba | Pete-Cusso (ex S | 118.66 | 0.0 | 0 | 0 | 0.5 | 64 | 64 | 1.1 | 139 | 203 | 1.3 | 163 | 367 | 1.0 | 133 | 500 | 0.5 | 72 | 572 | 0.2 | 26 | 598 | 0.1 | 16 | 614 | 0.1 | 16 | 631 | 0.1 | 17 | 647 | 0.1 | 17 | 665 | 0.1 | 18 | 683 | 0.1 | 19 | 701 |
| Uige (2) | Damba | Camatambo | 118.66 | 0.0 | 0 | 0 | 0.6 | 79 | 79 | 1.4 | 171 | 250 | 1.5 | 201 | 450 | 1.2 | 164 | 614 | 0.6 | 89 | 703 | 0.2 | 32 | 735 | 0.1 | 20 | 755 | 0.1 | 20 | 775 | 0.1 | 21 | 796 | 0.1 | 21 | 817 | 0.1 | 22 | 839 | 0.1 | 23 | 862 |
| Uige (2) | Kangola | Caiongo | 118.66 | 0.0 | 0 | 0 | 3.9 | 473 | 473 | 8.1 | 1,023 | 1,497 | 9.3 | 1,205 | 2,701 | 7.4 | 982 | 3,683 | 3.9 | 533 | 4,216 | 1.4 | 192 | 4,408 | 0.8 | 118 | 4,526 | 0.8 | 121 | 4,647 | 0.8 | 125 | 4,772 | 0.8 | 129 | 4,900 | 0.8 | 132 | 5,033 | 0.8 | 136 | 5,169 |
| Uige (2) | Kangola | Bengo | 118.66 | 0.0 | 0 | 0 | 1.1 | 136 | 136 | 2.3 | 294 | 430 | 2.7 | 346 | 776 | 2.1 | 282 | 1,059 | 1.1 | 153 | 1,212 | 0.4 | 55 | 1,267 | 0.2 | 34 | 1,301 | 0.2 | 35 | 1,336 | 0.2 | 36 | 1,371 | 0.2 | 37 | 1,408 | 0.2 | 38 | 1,446 | 0.2 | 39 | 1,486 |
| Uige (2) | Sanza Pombo | Alfândega | 118.66 | 0.0 | 0 | 0 | 0.7 | 89 | 89 | 1.5 | 192 | 281 | 1.7 | 226 | 507 | 1.4 | 184 | 692 | 0.7 | 100 | 792 | 0.3 | 36 | 828 | 0.2 | 22 | 850 | 0.2 | 23 | 873 | 0.2 | 23 | 896 | 0.2 | 24 | 920 | 0.2 | 25 | 945 | 0.2 | 26 | 971 |
| Uige (2) | Sanza Pombo | Cuilo Pombo | 118.66 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.7 | 93 | 137 | 0.8 | 110 | 247 | 0.7 | 90 | 336 | 0.4 | 49 | 385 | 0.1 | 18 | 403 | 0.1 | 11 | 413 | 0.1 | 11 | 424 | 0.1 | 11 | 436 | 0.1 | 12 | 448 | 0.1 | 12 | 460 | 0.1 | 12 | 472 |
| Uige (2) | Sanza Pombo | Uamba | 118.66 | 0.0 | 0 | 0 | 0.5 | 62 | 62 | 1.1 | 134 | 196 | 1.2 | 158 | 354 | 1.0 | 129 | 483 | 0.5 | 70 | 553 | 0.2 | 25 | 578 | 0.1 | 15 | 594 | 0.1 | 16 | 610 | 0.1 | 16 | 626 | 0.1 | 17 | 643 | 0.1 | 17 | 660 | 0.1 | 18 | 678 |
| Uige (2) | Quitexe | Vista Alegre | 118.66 | 0.0 | 0 | 0 | 0.5 | 63 | 63 | 1.1 | 136 | 199 | 1.2 | 160 | 360 | 1.0 | 131 | 490 | 0.5 | 71 | 561 | 0.2 | 26 | 587 | 0.1 | 16 | 602 | 0.1 | 16 | 618 | 0.1 | 17 | 635 | 0.1 | 17 | 652 | 0.1 | 18 | 670 | 0.1 | 18 | 688 |
| Uige (2) | Quitexe | Aldeia de Viçosa | 118.66 | 0.0 | 0 | 0 | 0.7 | 84 | 84 | 1.4 | 182 | 267 | 1.7 | 215 | 482 | 1.3 | 175 | 657 | 0.7 | 95 | 752 | 0.2 | 34 | 786 | 0.1 | 21 | 807 | 0.1 | 22 | 828 | 0.1 | 22 | 851 | 0.1 | 23 | 874 | 0.1 | 24 | 897 | 0.1 | 24 | 922 |
| Uige (2) | Quitexe | Cambamba | 118.66 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.4 | 54 | 79 | 0.5 | 64 | 143 | 0.4 | 52 | 195 | 0.2 | 28 | 223 | 0.1 | 10 | 233 | 0.0 | 6 | 240 | 0.0 | 6 | 246 | 0.0 | 7 | 253 | 0.0 | 7 | 259 | 0.0 | 7 | 266 | 0.0 | 7 | 274 |
| Uige (2) | Quimbele | Icoca | 118.66 | 0.0 | 0 | 0 | 0.8 | 97 | 97 | 1.7 | 209 | 305 | 1.9 | 246 | 551 | 1.5 | 201 | 752 | 0.8 | 109 | 861 | 0.3 | 39 | 900 | 0.2 | 24 | 924 | 0.2 | 25 | 949 | 0.2 | 25 | 974 | 0.2 | 26 | 1,000 | 0.2 | 27 | 1,027 | 0.2 | 28 | 1,055 |
| Uige (2) | Quimbele | Cuango | 118.66 | 0.0 | 0 | 0 | 0.7 | 83 | 83 | 1.4 | 180 | 263 | 1.6 | 212 | 475 | 1.3 | 173 | 647 | 0.7 | 94 | 741 | 0.2 | 34 | 775 | 0.1 | 21 | 795 | 0.1 | 21 | 816 | 0.1 | 22 | 838 | 0.1 | 23 | 861 | 0.1 | 23 | 884 | 0.1 | 24 | 908 |
| Uige (2) | Quimbele | Alto-Zaza | 118.66 | 0.0 | 0 | 0 | 1.0 | 116 | 116 | 2.0 | 252 | 368 | 2.3 | 297 | 665 | 1.8 | 242 | 907 | 1.0 | 131 | 1,038 | 0.3 | 47 | 1,085 | 0.2 | 29 | 1,114 | 0.2 | 30 | 1,144 | 0.2 | 31 | 1,175 | 0.2 | 32 | 1,206 | 0.2 | 33 | 1,239 | 0.2 | 34 | 1,272 |
| Uige (2) | Milunga | Macocola | 118.66 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 52 | 76 | 0.5 | 61 | 136 | 0.4 | 50 | 186 | 0.2 | 27 | 213 | 0.1 | 10 | 222 | 0.0 | 6 | 228 | 0.0 | 6 | 234 | 0.0 | 6 | 241 | 0.0 | 6 | 247 | 0.0 | 7 | 254 | 0.0 | 7 | 261 |
| Uige (2) | Milunga | Macolo | 118.66 | 0.0 | 0 | 0 | 0.0 | 5 | 5 | 0.1 | 11 | 16 | 0.1 | 13 | 28 | 0.1 | 10 | 39 | 0.0 | 6 | 44 | 0.0 | 2 | 46 | 0.0 | 1 | 47 | 0.0 | 1 | 49 | 0.0 | 1 | 50 | 0.0 | 1 | 51 | 0.0 | 1 | 53 | 0.0 | 1 | 54 |
| Uige (2) | Milunga | Massau | 118.66 | 0.0 | 0 | 0 | 0.1 | 11 | 11 | 0.2 | 25 | 36 | 0.2 | 29 | 66 | 0.2 | 24 | 89 | 0.1 | 13 | 102 | 0.0 | 5 | 107 | 0.0 | 3 | 110 | 0.0 | 3 | 113 | 0.0 | 3 | 116 | 0.0 | 3 | 119 | 0.0 | 3 | 122 | 0.0 | 3 | 125 |
| Uige (2) | Mucaba | Mucaba | 118.66 | 0.0 | 0 | 0 | 3.5 | 422 | 422 | 7.3 | 913 | 1,335 | 8.3 | 1,075 | 2,409 | 6.6 | 876 | 3,286 | 3.5 | 475 | 3,760 | 1.2 | 171 | 3,932 | 0.7 | 105 | 4,037 | 0.7 | 108 | 4,145 | 0.7 | 111 | 4,256 | 0.7 | 115 | 4,371 | 0.7 | 118 | 4,489 | 0.7 | 122 | 4,611 |
| Uige (2) | Mucaba | Uando | 118.66 | 0.0 | 0 | 0 | 0.8 | 99 | 99 | 1.7 | 215 | 314 | 2.0 | 253 | 568 | 1.5 | 206 | 774 | 0.8 | 112 | 886 | 0.3 | 40 | 926 | 0.2 | 25 | 951 | 0.2 | 25 | 976 | 0.2 | 26 | 1,003 | 0.2 | 27 | 1,030 | 0.2 | 28 | 1,058 | 0.2 | 29 | 1,086 |
| Uige (2) | Nova Esperança | Camboso | 118.66 | 0.0 | 0 | 0 | 1.0 | 118 | 118 | 2.0 | 256 | 374 | 2.3 | 301 | 675 | 1.8 | 245 | 920 | 1.0 | 133 | 1,054 | 0.3 | 48 | 1,101 | 0.2 | 29 | 1,131 | 0.2 | 30 | 1,161 | 0.2 | 31 | 1,192 | 0.2 | 32 | 1,225 | 0.2 | 33 | 1,258 | 0.2 | 34 | 1,292 |
| Uige (2) | Nova Esperança | Buenga Sul | 118.66 | 0.0 | 0 | 0 | 0.2 | 26 | 26 | 0.4 | 56 | 81 | 0.5 | 66 | 147 | 0.4 | 53 | 200 | 0.2 | 29 | 229 | 0.1 | 10 | 240 | 0.0 | 6 | 246 | 0.0 | 7 | 253 | 0.0 | 7 | 260 | 0.0 | 7 | 267 | 0.0 | 7 | 274 | 0.0 | 7 | 281 |
| Zaire | Mbanza Congo | Luvo | 106.53 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 39 | 64 | 0.4 | 50 | 114 | 0.5 | 65 | 179 | 0.6 | 78 | 257 | 0.6 | 80 | 337 | 0.5 | 64 | 401 | 0.5 | 66 | 466 | 0.5 | 68 | 534 | 0.5 | 70 | 604 | 0.5 | 72 | 675 | 0.5 | 74 | 749 |
| Zaire | Mbanza Congo | Madimba | 106.53 | 0.0 | 0 | 0 | 0.1 | 6 | 6 | 0.1 | 9 | 15 | 0.1 | 12 | 27 | 0.1 | 15 | 42 | 0.1 | 18 | 60 | 0.1 | 19 | 79 | 0.1 | 15 | 94 | 0.1 | 15 | 109 | 0.1 | 16 | 125 | 0.1 | 16 | 141 | 0.1 | 17 | 158 | 0.1 | 17 | 175 |
| Zaire | Mbanza Congo | Kiende | 106.53 | 0.0 | 0 | 0 | 0.1 | 12 | 12 | 0.2 | 19 | 31 | 0.2 | 24 | 55 | 0.3 | 32 | 87 | 0.3 | 38 | 125 | 0.3 | 39 | 164 | 0.2 | 31 | 195 | 0.2 | 32 | 227 | 0.2 | 33 | 259 | 0.2 | 34 | 293 | 0.2 | 35 | 328 | 0.2 | 36 | 364 |
| Zaire | Mbanza Congo | Kaluca | 106.53 | 0.0 | 0 | 0 | 0.0 | 5 | 5 | 0.1 | 8 | 13 | 0.1 | 10 | 22 | 0.1 | 13 | 35 | 0.1 | 15 | 51 | 0.1 | 16 | 66 | 0.1 | 13 | 79 | 0.1 | 13 | 92 | 0.1 | 13 | 105 | 0.1 | 14 | 119 | 0.1 | 14 | 133 | 0.1 | 15 | 148 |
| Zaire | Mbanza Congo | Kalambata | 106.53 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.1 | 16 | 37 | 0.2 | 21 | 59 | 0.2 | 25 | 84 | 0.2 | 26 | 110 | 0.2 | 21 | 131 | 0.2 | 21 | 153 | 0.2 | 22 | 175 | 0.2 | 23 | 197 | 0.2 | 23 | 221 | 0.2 | 24 | 245 |
| Zaire | Soyo | Pedra de Feitiço | 106.53 | 0.0 | 0 | 0 | 0.3 | 30 | 30 | 0.4 | 46 | 76 | 0.5 | 60 | 136 | 0.7 | 78 | 214 | 0.8 | 93 | 307 | 0.8 | 96 | 403 | 0.6 | 76 | 479 | 0.6 | 78 | 558 | 0.6 | 81 | 638 | 0.6 | 83 | 722 | 0.6 | 86 | 807 | 0.6 | 88 | 896 |
| Zaire | Soyo | Sumba | 106.53 | 0.0 | 0 | 0 | 0.1 | 15 | 15 | 0.2 | 23 | 37 | 0.3 | 29 | 66 | 0.3 | 38 | 104 | 0.4 | 45 | 150 | 0.4 | 47 | 197 | 0.3 | 37 | 234 | 0.3 | 38 | 272 | 0.3 | 39 | 311 | 0.3 | 41 | 352 | 0.3 | 42 | 394 | 0.3 | 43 | 437 |
| Zaire | Soyo | Kelo | 106.53 | 0.0 | 0 | 0 | 0.1 | 9 | 9 | 0.1 | 13 | 22 | 0.1 | 17 | 39 | 0.2 | 22 | 61 | 0.2 | 26 | 87 | 0.2 | 27 | 115 | 0.2 | 22 | 136 | 0.2 | 22 | 159 | 0.2 | 23 | 181 | 0.2 | 24 | 205 | 0.2 | 24 | 230 | 0.2 | 25 | 255 |
| Zaire | Soyo | Mangue Grande | 106.53 | 0.0 | 0 | 0 | 0.3 | 31 | 31 | 0.4 | 48 | 79 | 0.5 | 61 | 140 | 0.7 | 80 | 220 | 0.8 | 96 | 316 | 0.8 | 98 | 414 | 0.6 | 78 | 493 | 0.6 | 81 | 573 | 0.6 | 83 | 656 | 0.6 | 86 | 742 | 0.6 | 88 | 830 | 0.6 | 91 | 921 |
|

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 NEW ACCESS (x1000) | 2014 COST 2014 (X1000) | 2014 CUM. COST (X1000) | 2015 NEW ACCESS (x1000) | 2015 COST 2015 (X1000) | 2015 CUM. COST (X1000) | 2016 NEW ACCESS (x1000) | 2016 COST 2016 (X1000) | 2016 CUM. COST (X1000) | 2017 NEW ACCESS (x1000) | 2017 COST 2017 (X1000) | 2017 CUM. COST (X1000) | 2018 NEW ACCESS (x1000) | 2018 COST 2018 (X1000) | 2018 CUM. COST (X1000) | 2019 NEW ACCESS (x1000) | 2019 COST 2019 (X1000) | 2019 CUM. COST (X1000) | 2020 NEW ACCESS (x1000) | 2020 COST 2020 (X1000) | 2020 CUM. COST (X1000) | 2021 NEW ACCESS (x1000) | 2021 COST 2021 (X1000) | 2021 CUM. COST (X1000) | 2022 NEW ACCESS (x1000) | 2022 COST 2022 (X1000) | 2022 CUM. COST (X1000) | 2023 NEW ACCESS (x1000) | 2023 COST 2023 (X1000) | 2023 CUM. COST (X1000) | 2024 NEW ACCESS (x1000) | 2024 COST 2024 (X1000) | 2024 CUM. COST (X1000) | 2025 NEW ACCESS (x1000) | 2025 COST 2025 (X1000) | 2025 CUM. COST (X1000) | 2026 NEW ACCESS (x1000) | 2026 COST 2026 (X1000) | 2026 CUM. COST (X1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECTION BY MUNICIPALITY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | Caxito (Dande) | | 108.25 | 0.0 | 0 | 0 | 0.6 | 72 | 72 | 1.0 | 112 | 184 | 1.2 | 144 | 328 | 1.5 | 188 | 516 | 1.8 | 224 | 740 | 1.8 | 231 | 971 | 1.4 | 184 | 1,155 | 1.4 | 189 | 1,344 | 1.4 | 195 | 1,539 | 1.4 | 201 | 1,739 | 1.4 | 207 | 1,946 | 1.4 | 213 | 2,159 |
| Bengo | Catete (Icolo e Bengo) | | 108.25 | 0.0 | 0 | 0 | 0.4 | 47 | 47 | 0.6 | 72 | 119 | 0.8 | 93 | 213 | 1.0 | 122 | 334 | 1.2 | 145 | 479 | 1.2 | 149 | 629 | 0.9 | 119 | 748 | 0.9 | 123 | 870 | 0.9 | 126 | 996 | 0.9 | 130 | 1,126 | 0.9 | 134 | 1,260 | 0.9 | 138 | 1,398 |
| Bengo | Quissama | | 108.25 | 0.0 | 0 | 0 | 0.5 | 52 | 52 | 0.7 | 81 | 133 | 0.9 | 104 | 236 | 1.1 | 135 | 371 | 1.3 | 161 | 533 | 1.3 | 166 | 699 | 1.0 | 132 | 831 | 1.0 | 136 | 967 | 1.0 | 140 | 1,108 | 1.0 | 144 | 1,252 | 1.0 | 149 | 1,401 | 1.0 | 153 | 1,554 |
| Bengo | Ambriz | | 108.25 | 0.0 | 0 | 0 | 0.0 | 3 | 3 | 0.0 | 5 | 9 | 0.1 | 7 | 16 | 0.1 | 9 | 24 | 0.1 | 11 | 35 | 0.1 | 11 | 46 | 0.1 | 9 | 55 | 0.1 | 9 | 63 | 0.1 | 9 | 73 | 0.1 | 9 | 82 | 0.1 | 10 | 92 | 0.1 | 10 | 102 |
| Bengo | Nambuangongo | | 108.25 | 0.0 | 0 | 0 | 1.1 | 119 | 119 | 1.6 | 183 | 302 | 2.0 | 236 | 538 | 2.5 | 308 | 846 | 2.9 | 367 | 1,213 | 2.9 | 378 | 1,591 | 2.3 | 301 | 1,892 | 2.3 | 310 | 2,202 | 2.3 | 319 | 2,522 | 2.3 | 329 | 2,851 | 2.3 | 339 | 3,190 | 2.3 | 349 | 3,539 |
| Bengo | Bula - Atumba | | 108.25 | 0.0 | 0 | 0 | 0.2 | 19 | 19 | 0.2 | 29 | 47 | 0.3 | 37 | 84 | 0.4 | 48 | 132 | 0.5 | 57 | 189 | 0.5 | 59 | 248 | 0.4 | 47 | 295 | 0.4 | 48 | 344 | 0.4 | 50 | 394 | 0.4 | 51 | 445 | 0.4 | 53 | 498 | 0.4 | 54 | 553 |
| Bengo | Dembos | | 108.25 | 0.0 | 0 | 0 | 0.7 | 82 | 82 | 1.1 | 126 | 208 | 1.4 | 163 | 371 | 1.7 | 212 | 583 | 2.0 | 253 | 836 | 2.0 | 261 | 1,097 | 1.6 | 207 | 1,304 | 1.6 | 214 | 1,518 | 1.6 | 220 | 1,738 | 1.6 | 227 | 1,965 | 1.6 | 233 | 2,198 | 1.6 | 241 | 2,439 |
| Bengo | Pango - Aluquém | | 108.25 | 0.0 | 0 | 0 | 0.2 | 28 | 28 | 0.4 | 43 | 71 | 0.5 | 55 | 126 | 0.6 | 72 | 198 | 0.7 | 86 | 284 | 0.7 | 89 | 372 | 0.5 | 70 | 443 | 0.5 | 73 | 516 | 0.5 | 75 | 590 | 0.5 | 77 | 667 | 0.5 | 79 | 747 | 0.5 | 82 | 828 |
| Benguela | Benguela | | 92.93 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Benguela | Baía Farta | | 92.93 | 0.0 | 0 | 0 | 0.2 | 15 | 15 | 0.2 | 23 | 38 | 0.3 | 30 | 69 | 0.4 | 39 | 108 | 0.4 | 47 | 154 | 0.4 | 48 | 203 | 0.3 | 38 | 241 | 0.3 | 39 | 280 | 0.3 | 41 | 321 | 0.3 | 42 | 363 | 0.3 | 43 | 406 | 0.3 | 44 | 451 |
| Benguela | Lobito | | 92.93 | 0.0 | 0 | 0 | 1.4 | 132 | 132 | 2.1 | 203 | 335 | 2.6 | 262 | 597 | 3.3 | 342 | 939 | 3.8 | 408 | 1,346 | 3.8 | 420 | 1,766 | 2.9 | 334 | 2,100 | 2.9 | 344 | 2,444 | 2.9 | 354 | 2,799 | 2.9 | 365 | 3,164 | 2.9 | 376 | 3,540 | 2.9 | 387 | 3,927 |
| Benguela | Cubal | | 92.93 | 0.0 | 0 | 0 | 2.9 | 279 | 279 | 4.4 | 431 | 710 | 5.5 | 555 | 1,264 | 6.9 | 724 | 1,988 | 8.0 | 863 | 2,851 | 8.0 | 889 | 3,740 | 6.2 | 708 | 4,448 | 6.2 | 729 | 5,177 | 6.2 | 751 | 5,928 | 6.2 | 773 | 6,701 | 6.2 | 796 | 7,497 | 6.2 | 820 | 8,317 |
| Benguela | Ganda | | 92.93 | 0.0 | 0 | 0 | 1.8 | 172 | 172 | 2.7 | 266 | 438 | 3.4 | 343 | 781 | 4.3 | 447 | 1,228 | 4.9 | 533 | 1,761 | 4.9 | 549 | 2,310 | 3.8 | 437 | 2,747 | 3.8 | 450 | 3,197 | 3.8 | 464 | 3,660 | 3.8 | 477 | 4,138 | 3.8 | 492 | 4,630 | 3.8 | 507 | 5,136 |
| Benguela | Balombo | | 92.93 | 0.0 | 0 | 0 | 0.9 | 85 | 85 | 1.3 | 131 | 216 | 1.7 | 169 | 384 | 2.1 | 220 | 604 | 2.4 | 262 | 867 | 2.4 | 270 | 1,137 | 1.9 | 215 | 1,352 | 1.9 | 222 | 1,573 | 1.9 | 228 | 1,801 | 1.9 | 235 | 2,036 | 1.9 | 242 | 2,279 | 1.9 | 249 | 2,528 |
| Benguela | Bocoio | | 92.93 | 0.0 | 0 | 0 | 1.7 | 162 | 162 | 2.5 | 250 | 412 | 3.2 | 322 | 733 | 4.0 | 420 | 1,153 | 4.6 | 500 | 1,653 | 4.6 | 515 | 2,169 | 3.6 | 410 | 2,579 | 3.6 | 423 | 3,002 | 3.6 | 435 | 3,437 | 3.6 | 448 | 3,885 | 3.6 | 462 | 4,347 | 3.6 | 476 | 4,823 |
| Benguela | Caimbambo | | 92.93 | 0.0 | 0 | 0 | 0.3 | 32 | 32 | 0.5 | 50 | 82 | 0.6 | 64 | 145 | 0.8 | 83 | 229 | 0.9 | 99 | 328 | 0.9 | 102 | 430 | 0.7 | 81 | 511 | 0.7 | 84 | 595 | 0.7 | 86 | 681 | 0.7 | 89 | 770 | 0.7 | 92 | 862 | 0.7 | 94 | 956 |
| Benguela | Chongoroi | | 92.93 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 13 | 21 | 0.2 | 16 | 37 | 0.2 | 21 | 58 | 0.2 | 25 | 83 | 0.2 | 26 | 109 | 0.2 | 21 | 130 | 0.2 | 21 | 151 | 0.2 | 22 | 173 | 0.2 | 23 | 195 | 0.2 | 23 | 218 | 0.2 | 24 | 242 |
| Bié | Andulo | | 100.64 | 0.0 | 0 | 0 | 2.4 | 251 | 251 | 3.6 | 388 | 639 | 4.5 | 500 | 1,139 | 5.8 | 652 | 1,791 | 6.7 | 778 | 2,568 | 6.7 | 801 | 3,369 | 5.1 | 637 | 4,007 | 5.1 | 657 | 4,663 | 5.1 | 676 | 5,339 | 5.1 | 696 | 6,036 | 5.1 | 717 | 6,753 | 5.1 | 739 | 7,492 |
| Bié | Camacupa | | 100.64 | 0.0 | 0 | 0 | 1.5 | 157 | 157 | 2.3 | 242 | 398 | 2.8 | 311 | 710 | 3.6 | 406 | 1,116 | 4.2 | 485 | 1,601 | 4.2 | 499 | 2,100 | 3.2 | 397 | 2,497 | 3.2 | 409 | 2,906 | 3.2 | 421 | 3,328 | 3.2 | 434 | 3,762 | 3.2 | 447 | 4,209 | 3.2 | 461 | 4,670 |
| Bié | Catabola | | 100.64 | 0.0 | 0 | 0 | 1.6 | 171 | 171 | 2.5 | 264 | 435 | 3.1 | 340 | 774 | 3.9 | 443 | 1,217 | 4.5 | 529 | 1,746 | 4.5 | 544 | 2,290 | 3.5 | 433 | 2,724 | 3.5 | 446 | 3,170 | 3.5 | 460 | 3,629 | 3.5 | 473 | 4,103 | 3.5 | 488 | 4,591 | 3.5 | 502 | 5,093 |
| Bié | Chinguar | | 100.64 | 0.0 | 0 | 0 | 1.3 | 131 | 131 | 1.9 | 202 | 332 | 2.4 | 260 | 592 | 3.0 | 339 | 930 | 3.5 | 404 | 1,334 | 3.5 | 416 | 1,750 | 2.7 | 331 | 2,082 | 2.7 | 341 | 2,423 | 2.7 | 351 | 2,774 | 2.7 | 362 | 3,136 | 2.7 | 373 | 3,509 | 2.7 | 384 | 3,892 |
| Bié | Chitembo | | 100.64 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.6 | 66 | 109 | 0.8 | 85 | 194 | 1.0 | 111 | 305 | 1.1 | 132 | 437 | 1.1 | 136 | 574 | 0.9 | 109 | 682 | 0.9 | 112 | 794 | 0.9 | 115 | 909 | 0.9 | 119 | 1,028 | 0.9 | 122 | 1,150 | 0.9 | 126 | 1,276 |
| Bié | Cuemba | | 100.64 | 0.0 | 0 | 0 | 0.1 | 12 | 12 | 0.2 | 18 | 29 | 0.2 | 23 | 52 | 0.3 | 30 | 82 | 0.3 | 36 | 118 | 0.3 | 37 | 155 | 0.2 | 29 | 184 | 0.2 | 30 | 214 | 0.2 | 31 | 245 | 0.2 | 32 | 277 | 0.2 | 33 | 310 | 0.2 | 34 | 344 |
| Bié | Cunhinga (Vouga) | | 100.64 | 0.0 | 0 | 0 | 0.7 | 76 | 76 | 1.1 | 117 | 193 | 1.4 | 151 | 344 | 1.7 | 197 | 541 | 2.0 | 235 | 775 | 2.0 | 242 | 1,017 | 1.6 | 192 | 1,210 | 1.6 | 198 | 1,408 | 1.6 | 204 | 1,612 | 1.6 | 210 | 1,822 | 1.6 | 217 | 2,039 | 1.6 | 223 | 2,262 |
| Bié | Kuito | | 100.64 | 0.0 | 0 | 0 | 5.8 | 606 | 606 | 8.8 | 936 | 1,541 | 11.0 | 1,205 | 2,746 | 13.9 | 1,572 | 4,318 | 16.1 | 1,875 | 6,192 | 16.1 | 1,931 | 8,123 | 12.4 | 1,537 | 9,660 | 12.4 | 1,583 | 11,243 | 12.4 | 1,630 | 12,873 | 12.4 | 1,679 | 14,552 | 12.4 | 1,730 | 16,282 | 12.4 | 1,781 | 18,063 |
| Bié | Nharea | | 100.64 | 0.0 | 0 | 0 | 1.0 | 101 | 101 | 1.5 | 155 | 256 | 1.8 | 200 | 456 | 2.3 | 261 | 717 | 2.7 | 311 | 1,028 | 2.7 | 321 | 1,349 | 2.1 | 255 | 1,604 | 2.1 | 263 | 1,866 | 2.1 | 271 | 2,137 | 2.1 | 279 | 2,416 | 2.1 | 287 | 2,703 | 2.1 | 296 | 2,999 |
| Cabinda | Belize | | 91.69 | 0.0 | 0 | 0 | 0.2 | 20 | 20 | 0.3 | 30 | 50 | 0.4 | 39 | 89 | 0.5 | 51 | 140 | 0.6 | 61 | 200 | 0.6 | 62 | 263 | 0.4 | 50 | 312 | 0.4 | 51 | 364 | 0.4 | 53 | 416 | 0.4 | 54 | 471 | 0.4 | 56 | 527 | 0.4 | 58 | 584 |
| Cabinda | Buco Zau | | 91.69 | 0.0 | 0 | 0 | 0.4 | 39 | 39 | 0.6 | 60 | 99 | 0.8 | 77 | 176 | 1.0 | 101 | 277 | 1.1 | 120 | 397 | 1.1 | 124 | 520 | 0.9 | 98 | 619 | 0.9 | 101 | 720 | 0.9 | 104 | 825 | 0.9 | 108 | 932 | 0.9 | 111 | 1,043 | 0.9 | 114 | 1,157 |
| Cabinda | Cabinda | | 91.69 | 0.0 | 0 | 0 | 1.0 | 95 | 95 | 1.5 | 147 | 242 | 1.9 | 189 | 431 | 2.4 | 247 | 678 | 2.8 | 294 | 972 | 2.8 | 303 | 1,275 | 2.1 | 241 | 1,516 | 2.1 | 248 | 1,765 | 2.1 | 256 | 2,021 | 2.1 | 264 | 2,284 | 2.1 | 272 | 2,556 | 2.1 | 280 | 2,836 |
| Cabinda | Cacongo | | 91.69 | 0.0 | 0 | 0 | 0.7 | 62 | 62 | 1.0 | 95 | 157 | 1.2 | 122 | 279 | 1.5 | 160 | 439 | 1.8 | 190 | 629 | 1.8 | 196 | 825 | 1.4 | 156 | 982 | 1.4 | 161 | 1,142 | 1.4 | 166 | 1,308 | 1.4 | 171 | 1,479 | 1.4 | 176 | 1,655 | 1.4 | 181 | 1,836 |
| Cunene | Cahama | | 89.80 | 0.0 | 0 | 0 | 0.3 | 29 | 29 | 0.5 | 45 | 74 | 0.6 | 58 | 131 | 0.7 | 75 | 207 | 0.9 | 90 | 296 | 0.9 | 92 | 389 | 0.7 | 74 | 462 | 0.7 | 76 | 538 | 0.7 | 78 | 616 | 0.7 | 80 | 697 | 0.7 | 83 | 779 | 0.7 | 85 | 865 |
| Cunene | Cuanhama | | 89.80 | 0.0 | 0 | 0 | 3.0 | 273 | 273 | 4.4 | 422 | 695 | 5.5 | 543 | 1,238 | 7.0 | 709 | 1,947 | 8.1 | 845 | 2,792 | 8.1 | 871 | 3,663 | 6.3 | 693 | 4,356 | 6.3 | 714 | 5,070 | 6.3 | 735 | 5,805 | 6.3 | 757 | 6,562 | 6.3 | 780 | 7,342 | 6.3 | 803 | 8,145 |
| Cunene | Curoca | | 89.80 | 0.0 | 0 | 0 | 0.4 | 41 | 41 | 0.7 | 63 | 104 | 0.8 | 82 | 186 | 1.1 | 107 | 293 | 1.2 | 127 | 420 | 1.2 | 131 | 551 | 0.9 | 104 | 655 | 0.9 | 107 | 762 | 0.9 | 110 | 872 | 0.9 | 114 | 986 | 0.9 | 117 | 1,103 | 0.9 | 121 | 1,224 |
| Cunene | Cuvelai | | 89.80 | 0.0 | 0 | 0 | 1.8 | 167 | 167 | 2.7 | 259 | 426 | 3.4 | 333 | 759 | 4.3 | 434 | 1,193 | 5.0 | 518 | 1,711 | 5.0 | 534 | 2,245 | 3.8 | 425 | 2,669 | 3.8 | 437 | 3,107 | 3.8 | 451 | 3,557 | 3.8 | 464 | 4,021 | 3.8 | 478 | 4,499 | 3.8 | 492 | 4,992 |
| Cunene | Namacunde | | 89.80 | 0.0 | 0 | 0 | 1.3 | 125 | 125 | 2.0 | 193 | 317 | 2.5 | 248 | 565 | 3.2 | 323 | 889 | 3.7 | 386 | 1,274 | 3.7 | 397 | 1,672 | 2.9 | 316 | 1,988 | 2.9 | 326 | 2,314 | 2.9 | 336 | 2,649 | 2.9 | 346 | 2,995 | 2.9 | 356 | 3,351 | 2.9 | 367 | 3,717 |
| Cunene | Ombadja | | 89.80 | 0.0 | 0 | 0 | 3.0 | 274 | 274 | 4.5 | 424 | 698 | 5.6 | 546 | 1,244 | 7.0 | 712 | 1,957 | 8.2 | 849 | 2,806 | 8.2 | 875 | 3,681 | 6.3 | 696 | 4,377 | 6.3 | 717 | 5,095 | 6.3 | 739 | 5,833 | 6.3 | 761 | 6,594 | 6.3 | 784 | 7,378 | 6.3 | 807 | 8,185 |
| Huambo | Bailundo | | 104.72 | 0.0 | 0 | 0 | 6.9 | 749 | 749 | 14.6 | 1,621 | 2,370 | 16.7 | 1,908 | 4,278 | 13.2 | 1,556 | 5,833 | 6.9 | 843 | 6,677 | 2.4 | 304 | 6,981 | 1.4 | 186 | 7,167 | 1.4 | 192 | 7,359 | 1.4 | 198 | 7,557 | 1.4 | 204 | 7,760 | 1.4 | 210 | 7,970 | 1.4 | 216 | 8,186 |
| Huambo | Caála | | 104.72 | 0.0 | 0 | 0 | 4.1 | 443 | 443 | 8.6 | 959 | 1,403 | 9.9 | 1,129 | 2,532 | 7.8 | 921 | 3,452 | 4.1 | 499 | 3,952 | 1.4 | 180 | 4,131 | 0.9 | 110 | 4,242 | 0.9 | 114 | 4,355 | 0.9 | 117 | 4,472 | 0.9 | 121 | 4,593 | 0.9 | 124 | 4,717 | 0.9 | 128 | 4,845 |
| Huambo | Cathihungo | | 104.72 | 0.0 | 0 | 0 | 3.4 | 363 | 363 | 7.1 | 785 | 1,148 | 8.1 | 924 | 2,072 | 6.4 | 753 | 2,825 | 3.4 | 408 | 3,234 | 1.2 | 147 | 3,381 | 0.7 | 90 | 3,471 | 0.7 | 93 | 3,564 | 0.7 | 96 | 3,660 | 0.7 | 99 | 3,759 | 0.7 | 102 | 3,860 | 0.7 | 105 | 3,965 |
| Huambo | Ecunha | | 104.72 | 0.0 | 0 | 0 | 1.1 | 114 | 114 | 2.2 | 247 | 361 | 2.5 | 291 | 652 | 2.0 | 237 | 890 | 1.1 | 129 | 1,018 | 0.4 | 46 | 1,065 | 0.2 | 28 | 1,093 | 0.2 | 29 | 1,122 | 0.2 | 30 | 1,153 | 0.2 | 31 | 1,184 | 0.2 | 32 | 1,216 | 0.2 | 33 | 1,249 |
| Huambo | Huambo | | 104.72 | 0.0 | 0 | 0 | 5.5 | 591 | 591 | 11.5 | 1,277 | 1,868 | 13.1 | 1,504 | 3,371 | 10.4 | 1,226 | 4,597 | 5.5 | 665 | 5,262 | 1.9 | 240 | 5,501 | 1.1 | 147 | 5,648 | 1.1 | 151 | 5,800 | 1.1 | 156 | 5,956 | 1.1 | 161 | 6,116 | 1.1 | 165 | 6,281 | 1.1 | 170 | 6,452 |
| Huambo | Londuimbali | | 104.72 | 0.0 | 0 | 0 | 2.4 | 254 | 254 | 4.9 | 549 | 803 | 5.7 | 647 | 1,450 | 4.5 | 527 | 1,977 | 2.4 | 286 | 2,263 | 0.8 | 103 | 2,366 | 0.5 | 63 | 2,429 | 0.5 | 65 | 2,494 | 0.5 | 67 | 2,561 | 0.5 | 69 | 2,630 | 0.5 | 71 | 2,702 | 0.5 | 73 | 2,775 |
| Huambo | Longonjo | | 104.72 | 0.0 | 0 | 0 | 2.0 | 214 | 214 | 4.2 | 463 | 678 | 4.8 | 546 | 1,223 | 3.8 | 445 | 1,668 | 2.0 | 241 | 1,909 | 0.7 | 87 | 1,996 | 0.4 | 53 | 2,049 | 0.4 | 55 | 2,104 | 0.4 | 57 | 2,161 | 0.4 | 58 | 2,219 | 0.4 | 60 | 2,279 | 0.4 | 62 | 2,341 |
| Huambo | Mungo | | 104.72 | 0.0 | 0 | 0 | 1.3 | 139 | 139 | 2.7 | 301 | 440 | 3.1 | 355 | 795 | 2.5 | 289 | 1,084 | 1.3 | 157 | 1,241 | 0.5 | 57 | 1,297 | 0.3 | 35 | 1,332 | 0.3 | 36 | 1,368 | 0.3 | 37 | 1,405 | 0.3 | 38 | 1,442 | 0.3 | 39 | 1,481 | 0.3 | 40 | 1,522 |
| Huambo | Tchicala-Tcholohanga | | 104.72 | 0.0 | 0 | 0 | 3.0 | 321 | 321 | 6.2 | 694 | 1,015 | 7.1 | 817 | 1,832 | 5.7 | 666 | 2,498 | 3.0 | 361 | 2,859 | 1.0 | 130 | 2,989 | 0.6 | 80 | 3,069 | 0.6 | 82 | 3,151 | 0.6 | 85 | 3,236 | 0.6 | 87 | 3,323 | 0.6 | 90 | 3,413 | 0.6 | 93 | 3,505 |
| Huambo | Tchindjenje | | 104.72 | 0.0 | 0 | 0 | 0.4 | 48 | 48 | 0.9 | 104 | 152 | 1.1 | 123 | 275 | 0.8 | 100 | 375 | 0.4 | 54 | 429 | 0.2 | 20 | 449 | 0.1 | 12 | 461 | 0.1 | 12 | 473 | 0.1 | 13 | 486 | 0.1 | 13 | 499 | 0.1 | 13 | 512 | 0.1 | 14 | 526 |
| Huambo | Ucuma | | 104.72 | 0.0 | 0 | 0 | 0.4 | 40 | 40 | 0.8 | 86 | 126 | 0.9 | 102 | 228 | 0.7 | 83 | 310 | 0.4 | 45 | 355 | 0.1 | 16 | 371 | 0.1 | 10 | 381 | 0.1 | 10 | 392 | 0.1 | 11 | 402 | 0.1 | 11 | 413 | 0.1 | 11 | 424 | 0.1 | 11 | 436 |
| Huíla | Caconda | | 89.00 | 0.0 | 0 | 0 | 3.2 | 293 | 293 | 4.8 | 453 | 746 | 6.0 | 583 | 1,329 | 7.6 | 761 | 2,090 | 8.8 | 907 | 2,997 | 8.8 | 934 | 3,931 | 6.8 | 744 | 4,675 | 6.8 | 766 | 5,441 | 6.8 | 789 | 6,230 | 6.8 | 813 | 7,043 | 6.8 | 837 | 7,880 | 6.8 | 862 | 8,742 |
| Huíla | Cacula | | 89.00 | 0.0 | 0 | 0 | 0.8 | 74 | 74 | 1.2 | 114 | 187 | 1.5 | 146 | 333 | 1.9 | 191 | 524 | 2.2 | 228 | 752 | 2.2 | 234 | 986 | 1.7 | 187 | 1,173 | 1.7 | 192 | 1,365 | 1.7 | 198 | 1,563 | 1.7 | 204 | 1,767 | 1.7 | 210 | 1,977 | 1.7 | 216 | 2,193 |
| Huíla | Caluquembe | | 89.00 | 0.0 | 0 | 0 | 0.9 | 81 | 81 | 1.3 | 125 | 206 | 1.7 | 161 | 366 | 2.1 | 210 | 576 | 2.4 | 250 | 826 | 2.4 | 258 | 1,084 | 1.9 | 205 | 1,289 | 1.9 | 211 | 1,500 | 1.9 | 217 | 1,717 | 1.9 | 224 | 1,941 | 1.9 | 231 | 2,172 | 1.9 | 238 | 2,410 |
| Huíla | Chibia | | 89.00 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.2 | 16 | 27 | 0.2 | 21 | 47 | 0.3 | 27 | 74 | 0.3 | 32 | 107 | 0.3 | 33 | 140 | 0.2 | 27 | 167 | 0.2 | 27 | 194 | 0.2 | 28 | 222 | 0.2 | 29 | 251 | 0.2 | 30 | 281 | 0.2 | 31 | 312 |
| Huíla | Chicomba | | 89.00 | 0.0 | 0 | 0 | 0.4 | 38 | 38 | 0.6 | 59 | 97 | 0.8 | 76 | 173 | 1.0 | 99 | 272 | 1.1 | 118 | 390 | 1.1 | 121 | 511 | 0.9 | 97 | 608 | 0.9 | 100 | 707 | 0.9 | 103 | 810 | 0.9 | 106 | 916 | 0.9 | 109 | 1,024 | 0.9 | 112 | 1,136 |
| Huíla | Chipindo | | 89.00 | 0.0 | 0 | 0 | 0.0 | 4 | 4 | 0.1 | 6 | 10 | 0.1 | 8 | 18 | 0.1 | 10 | 28 | 0.1 | 12 | 40 | 0.1 | 12 | 52 | 0.1 | 10 | 62 | 0.1 | 10 | 73 | 0.1 | 11 | 83 | 0.1 | 11 | 94 | 0.1 | 11 | 105 | 0.1 | 11 | 117 |
| Huíla | Gambos | | 89.00 | 0.0 | 0 | 0 | 0.5 | 46 | 46 | 0.8 | 71 | 118 | 0.9 | 92 | 210 | 1.2 | 120 | 330 | 1.4 | 143 | 473 | 1.4 | 147 | 620 | 1.1 | 117 | 737 | 1.1 | 121 | 858 | 1.1 | 124 | 983 | 1.1 | 128 | 1,111 | 1.1 | 132 | 1,243 | 1.1 | 136 | 1,379 |
| Huíla | Humpata | | 89.00 | 0.0 | 0 | 0 | 1.0 | 95 | 95 | 1.6 | 148 | 243 | 2.0 | 190 | 433 | 2.5 | 248 | 681 | 2.9 | 296 | 976 | 2.9 | 304 | 1,281 | 2.2 | 242 | 1,523 | 2.2 | 250 | 1,773 | 2.2 | 257 | 2,030 | 2.2 | 265 | 2,294 | 2.2 | 273 | 2,567 | 2.2 | 281 | 2,848 |
| Huíla | Jamba | | 89.00 | 0.0 | 0 | 0 | 1.2 | 106 | 106 | 1.7 | 164 | 271 | 2.2 | 211 | 482 | 2.8 | 276 | 758 | 3.2 | 329 | 1,087 | 3.2 | 339 | 1,426 | 2.5 | 270 | 1,696 | 2.5 | 278 | 1,973 | 2.5 | 286 | 2,260 | 2.5 | 295 | 2,554 | 2.5 | 304 | 2,858 | 2.5 | 313 | 3,171 |
| Huíla | Kuvango | | 89.00 | 0.0 | 0 | 0 | 0.6 | 57 | 57 | 0.9 | 88 | 146 | 1.2 | 114 | 260 | 1.5 | 149 | 408 | 1.7 | 177 | 585 | 1.7 | 183 | 768 | 1.3 | 145 | 913 | 1.3 | 150 | 1,063 | 1.3 | 154 | 1,217 | 1.3 | 159 | 1,376 | 1.3 | 164 | 1,539 | 1.3 | 168 | 1,708 |
| Huíla | Lubango | | 89.00 | 0.0 | 0 | 0 | 4.0 | 363 | 363 | 5.9 | 560 | 923 | 7.4 | 721 | 1,644 | 9.4 | 941 | 2,586 | 10.9 | 1,123 | 3,708 | 10.9 | 1,156 | 4,865 | 8.4 | 920 | 5,785 | 8.4 | 948 | 6,733 | 8.4 | 976 | 7,709 | 8.4 | 1,006 | 8,715 | 8.4 | 1,036 | 9,750 | 8.4 | 1,067 | 10,817 |
| Huíla | Matala | | 89.00 | 0.0 | 0 | 0 | 4.3 | 396 | 396 | 6.5 | 612 | 1,008 | 8.1 | 788 | 1,797 | 10.3 | 1,028 | 2,825 | 11.9 | 1,226 | 4,052 | 11.9 | 1,263 | 5,315 | 9.2 | 1,005 | 6,320 | 9.2 | 1,036 | 7,356 | 9.2 | 1,067 | 8,423 | 9.2 | 1,099 | 9,521 | 9.2 | 1,132 | 10,653 | 9.2 | 1,166 | 11,819 |
| Huíla | Quilengues | | 89.00 | 0.0 | 0 | 0 | 0.8 | 76 | 76 | 1.3 | 118 | 195 | 1.6 | 152 | 347 | 2.0 | 198 | 545 | 2.3 | 237 | 782 | 2.3 | 244 | 1,026 | 1.8 | 194 | 1,220 | 1.8 | 200 | 1,420 | 1.8 | 206 | 1,626 | 1.8 | 212 | 1,838 | 1.8 | 218 | 2,056 | 1.8 | 225 | 2,281 |
| Huíla | Quipungo | | 89.00 | 0.0 | 0 | 0 | 2.9 | 262 | 262 | 4.3 | 405 | 667 | 5.4 | 522 | 1,189 | 6.8 | 681 | 1,869 | 7.9 | 812 | 2,681 | 7.9 | 836 | 3,517 | 6.1 | 665 | 4,182 | 6.1 | 685 | 4,868 | 6.1 | 706 | 5,574 | 6.1 | 727 | 6,301 | 6.1 | 749 | 7,050 | 6.1 | 771 | 7,821 |
| Kuando Kubango | Calai | | 121.62 | 0.0 | 0 | 0 | 0.1 | 8 | 8 | 0.1 | 12 | 20 | 0.1 | 15 | 35 | 0.1 | 20 | 55 | 0.2 | 24 | 79 | 0.2 | 25 | 104 | 0.1 | 20 | 124 | 0.1 | 20 | 144 | 0.1 | 21 | 165 | 0.1 | 22 | 187 | 0.1 | 22 | 209 | 0.1 | 23 | 232 |
| Kuando Kubango | Cuangar | | 121.62 | 0.0 | 0 | 0 | 0.3 | 32 | 32 | 0.4 | 50 | 82 | 0.5 | 64 | 146 | 0.6 | 84 | 230 | 0.7 | 100 | 330 | 0.7 | 103 | 433 | 0.5 | 82 | 514 | 0.5 | 84 | 599 | 0.5 | 87 | 686 | 0.5 | 89 | 775 | 0.5 | 92 | 867 | 0.5 | 95 | 962 |
| Kuando Kubango | Cuchi | | 121.62 | 0.0 | 0 | 0 | 0.5 | 63 | 63 | 0.8 | 97 | 160 | 0.9 | 125 | 286 | 1.2 | 164 | 449 | 1.4 | 195 | 644 | 1.4 | 201 | 845 | 1.1 | 160 | 1,005 | 1.1 | 165 | 1,170 | 1.1 | 170 | 1,340 | 1.1 | 175 | 1,515 | 1.1 | 180 | 1,695 | 1.1 | 185 | 1,880 |
| Kuando Kubango | Cuito Canavale | | 121.62 | 0.0 | 0 | 0 | 0.5 | 65 | 65 | 0.8 | 101 | 166 | 1.0 | 130 | 295 | 1.2 | 169 | 465 | 1.4 | 202 | 666 | 1.4 | 208 | 874 | 1.1 | 165 | 1,039 | 1.1 | 170 | 1,210 | 1.1 | 175 | 1,385 | 1.1 | 181 | 1,566 | 1.1 | 186 | 1,752 | 1.1 | 192 | 1,944 |
| Kuando Kubango | Dirico | | 121.62 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 38 | 63 | 0.4 | 50 | 113 | 0.5 | 65 | 177 | 0.5 | 77 | 254 | 0.5 | 79 | 334 | 0.4 | 63 | 397 | 0.4 | 65 | 462 | 0.4 | 67 | 529 | 0.4 | 69 | 598 | 0.4 | 71 | 669 | 0.4 | 73 | 742 |
| Kuando Kubango | Longo (Nancova) | | 121.62 | 0.0 | 0 | 0 | 0.1 | 7 | 7 | 0.1 | 11 | 18 | 0.1 | 14 | 32 | 0.1 | 19 | 51 | 0.2 | 22 | 73 | 0.2 | 23 | 96 | 0.1 | 18 | 114 | 0.1 | 19 | 133 | 0.1 | 19 | 152 | 0.1 | 20 | 172 | 0.1 | 20 | 192 | 0.1 | 21 | 213 |
| Kuando Kubango | Mavinga | | 121.62 | 0.0 | 0 | 0 | 0.2 | 25 | 25 | 0.3 | 39 | 65 | 0.4 | 51 | 115 | 0.5 | 66 | 181 | 0.6 | 79 | 260 | 0.6 | 81 | 341 | 0.4 | 65 | 406 | 0.4 | 66 | 472 | 0.4 | 68 | 541 | 0.4 | 71 | 611 | 0.4 | 73 | 684 | 0.4 | 75 | 759 |
| Kuando Kubango | Menongue | | 121.62 | 0.0 | 0 | 0 | 0.5 | 66 | 66 | 0.8 | 102 | 168 | 1.0 | 132 | 300 | 1.3 | 172 | 472 | 1.5 | 205 | 676 | 1.5 | 211 | 887 | 1.1 | 168 | 1,055 | 1.1 | 173 | 1,228 | 1.1 | 178 | 1,406 | 1.1 | 183 | 1,590 | 1.1 | 189 | 1,779 | 1.1 | 195 | 1,973 |
| Kuando Kubango | Rivungo | | 121.62 | 0.0 | 0 | 0 | 0.2 | 23 | 23 | 0.3 | 35 | 58 | 0.3 | 45 | 103 | 0.4 | 59 | 162 | 0.5 | 70 | 232 | 0.5 | 72 | 305 | 0.4 | 58 | 362 | 0.4 | 59 | 422 | 0.4 | 61 | 483 | 0.4 | 63 | 546 | 0.4 | 65 | 611 | 0.4 | 67 | 678 |
| Kuanza Norte | Banga | | 105.25 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.1 | 15 | 24 | 0.2 | 19 | 44 | 0.2

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | NEW ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | NEW ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Luanda | Maianga | | 88.87 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Luanda | Rangel | | 88.87 | 0.0 | 0 | 0 | 3.7 | 343 | 343 | 5.6 | 530 | 872 | 7.0 | 682 | 1,554 | 8.9 | 890 | 2,444 | 10.3 | 1,061 | 3,505 | 10.3 | 1,093 | 4,598 | 8.0 | 870 | 5,468 | 8.0 | 896 | 6,364 | 8.0 | 923 | 7,286 | 8.0 | 950 | 8,237 | 8.0 | 979 | 9,216 | 8.0 | 1,008 | 10,224 |
| Luanda | Samba | | 88.87 | 0.0 | 0 | 0 | 2.2 | 203 | 203 | 3.3 | 314 | 518 | 4.2 | 405 | 922 | 5.3 | 528 | 1,450 | 6.1 | 629 | 2,079 | 6.1 | 648 | 2,728 | 4.7 | 516 | 3,244 | 4.7 | 531 | 3,775 | 4.7 | 547 | 4,322 | 4.7 | 564 | 4,886 | 4.7 | 581 | 5,467 | 4.7 | 598 | 6,065 |
| Luanda | Sambizanga | | 88.87 | 0.0 | 0 | 0 | 3.7 | 343 | 343 | 5.6 | 530 | 872 | 7.0 | 682 | 1,554 | 8.9 | 890 | 2,444 | 10.3 | 1,061 | 3,505 | 10.3 | 1,093 | 4,598 | 8.0 | 870 | 5,468 | 8.0 | 896 | 6,364 | 8.0 | 923 | 7,286 | 8.0 | 950 | 8,237 | 8.0 | 979 | 9,216 | 8.0 | 1,008 | 10,224 |
| Luanda | Viana | | 88.87 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Lunda - Norte | Cambulo | | 99.59 | 0.0 | 0 | 0 | 0.2 | 23 | 23 | 0.3 | 36 | 59 | 0.4 | 46 | 105 | 0.5 | 60 | 164 | 0.6 | 71 | 236 | 0.6 | 74 | 309 | 0.5 | 59 | 368 | 0.5 | 60 | 428 | 0.5 | 62 | 490 | 0.5 | 64 | 554 | 0.5 | 66 | 620 | 0.5 | 68 | 688 |
| Lunda - Norte | Capenda-Camulemba | | 99.59 | 0.0 | 0 | 0 | 0.6 | 64 | 64 | 0.9 | 99 | 163 | 1.2 | 127 | 290 | 1.5 | 166 | 456 | 1.7 | 198 | 655 | 1.7 | 204 | 859 | 1.3 | 162 | 1,021 | 1.3 | 167 | 1,189 | 1.3 | 172 | 1,361 | 1.3 | 178 | 1,538 | 1.3 | 183 | 1,721 | 1.3 | 188 | 1,910 |
| Lunda - Norte | Caungula | | 99.59 | 0.0 | 0 | 0 | 0.3 | 33 | 33 | 0.5 | 51 | 84 | 0.6 | 66 | 150 | 0.8 | 86 | 235 | 0.9 | 102 | 338 | 0.9 | 105 | 443 | 0.7 | 84 | 527 | 0.7 | 86 | 613 | 0.7 | 89 | 702 | 0.7 | 92 | 793 | 0.7 | 94 | 888 | 0.7 | 97 | 985 |
| Lunda - Norte | Chitato | | 99.59 | 0.0 | 0 | 0 | 0.3 | 28 | 28 | 0.4 | 43 | 71 | 0.5 | 56 | 127 | 0.6 | 73 | 200 | 0.8 | 87 | 287 | 0.8 | 89 | 376 | 0.6 | 71 | 447 | 0.6 | 73 | 520 | 0.6 | 75 | 596 | 0.6 | 78 | 673 | 0.6 | 80 | 753 | 0.6 | 82 | 836 |
| Lunda - Norte | Cuango | | 99.59 | 0.0 | 0 | 0 | 4.3 | 438 | 438 | 6.4 | 677 | 1,114 | 8.0 | 871 | 1,986 | 10.1 | 1,136 | 3,122 | 11.7 | 1,355 | 4,477 | 11.7 | 1,396 | 5,873 | 9.1 | 1,111 | 6,985 | 9.1 | 1,144 | 8,129 | 9.1 | 1,179 | 9,308 | 9.1 | 1,214 | 10,522 | 9.1 | 1,251 | 11,773 | 9.1 | 1,288 | 13,061 |
| Lunda - Norte | Cuilo | | 99.59 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 37 | 61 | 0.4 | 48 | 109 | 0.6 | 62 | 171 | 0.6 | 74 | 245 | 0.6 | 76 | 321 | 0.5 | 61 | 382 | 0.5 | 63 | 445 | 0.5 | 64 | 509 | 0.5 | 66 | 576 | 0.5 | 68 | 644 | 0.5 | 70 | 715 |
| Lunda - Norte | Lubalo | | 99.59 | 0.0 | 0 | 0 | 0.4 | 43 | 43 | 0.6 | 66 | 109 | 0.8 | 85 | 194 | 1.0 | 111 | 305 | 1.1 | 133 | 438 | 1.1 | 137 | 574 | 0.9 | 109 | 683 | 0.9 | 112 | 795 | 0.9 | 115 | 910 | 0.9 | 119 | 1,029 | 0.9 | 122 | 1,151 | 0.9 | 126 | 1,277 |
| Lunda - Norte | Lucapa | | 99.59 | 0.0 | 0 | 0 | 0.8 | 85 | 85 | 1.2 | 131 | 216 | 1.6 | 169 | 385 | 2.0 | 220 | 606 | 2.3 | 263 | 868 | 2.3 | 271 | 1,139 | 1.8 | 216 | 1,355 | 1.8 | 222 | 1,577 | 1.8 | 229 | 1,805 | 1.8 | 235 | 2,041 | 1.8 | 243 | 2,283 | 1.8 | 250 | 2,533 |
| Lunda - Norte | Xá-muteba | | 99.59 | 0.0 | 0 | 0 | 1.2 | 120 | 120 | 1.8 | 186 | 306 | 2.2 | 239 | 545 | 2.8 | 312 | 858 | 3.2 | 372 | 1,230 | 3.2 | 383 | 1,613 | 2.5 | 305 | 1,918 | 2.5 | 314 | 2,233 | 2.5 | 324 | 2,557 | 2.5 | 333 | 2,890 | 2.5 | 343 | 3,234 | 2.5 | 354 | 3,587 |
| Lunda Sul | Cacolo | | 122.40 | 0.0 | 0 | 0 | 3.3 | 416 | 416 | 6.9 | 899 | 1,315 | 7.9 | 1,059 | 2,374 | 6.3 | 863 | 3,237 | 3.3 | 468 | 3,705 | 1.2 | 169 | 3,873 | 0.7 | 103 | 3,977 | 0.7 | 107 | 4,083 | 0.7 | 110 | 4,193 | 0.7 | 113 | 4,306 | 0.7 | 116 | 4,422 | 0.7 | 120 | 4,542 |
| Lunda Sul | Dala | | 122.40 | 0.0 | 0 | 0 | 3.5 | 445 | 445 | 7.4 | 964 | 1,409 | 8.5 | 1,134 | 2,543 | 6.7 | 925 | 3,468 | 3.5 | 501 | 3,970 | 1.2 | 181 | 4,150 | 0.7 | 111 | 4,261 | 0.7 | 114 | 4,375 | 0.7 | 118 | 4,493 | 0.7 | 121 | 4,614 | 0.7 | 125 | 4,739 | 0.7 | 128 | 4,867 |
| Lunda Sul | Muconda | | 122.40 | 0.0 | 0 | 0 | 5.2 | 656 | 656 | 10.9 | 1,418 | 2,074 | 12.5 | 1,669 | 3,743 | 9.9 | 1,361 | 5,105 | 5.2 | 738 | 5,842 | 1.8 | 266 | 6,109 | 1.1 | 163 | 6,272 | 1.1 | 168 | 6,440 | 1.1 | 173 | 6,613 | 1.1 | 178 | 6,791 | 1.1 | 184 | 6,974 | 1.1 | 189 | 7,164 |
| Lunda Sul | Saurimo | | 122.40 | 0.0 | 0 | 0 | 1.3 | 168 | 168 | 2.8 | 363 | 531 | 3.2 | 428 | 959 | 2.5 | 349 | 1,308 | 1.3 | 189 | 1,497 | 0.5 | 68 | 1,565 | 0.3 | 42 | 1,607 | 0.3 | 43 | 1,650 | 0.3 | 44 | 1,694 | 0.3 | 46 | 1,740 | 0.3 | 47 | 1,787 | 0.3 | 48 | 1,835 |
| Malanje | Caculama | | 96.72 | 0.0 | 0 | 0 | 0.7 | 65 | 65 | 1.0 | 101 | 166 | 1.2 | 130 | 296 | 1.6 | 170 | 466 | 1.8 | 202 | 668 | 1.8 | 208 | 877 | 1.4 | 166 | 1,042 | 1.4 | 171 | 1,213 | 1.4 | 176 | 1,389 | 1.4 | 181 | 1,570 | 1.4 | 187 | 1,757 | 1.4 | 192 | 1,949 |
| Malanje | Cacuso | | 96.72 | 0.0 | 0 | 0 | 1.2 | 123 | 123 | 1.9 | 190 | 313 | 2.3 | 245 | 558 | 2.9 | 319 | 877 | 3.4 | 381 | 1,258 | 3.4 | 392 | 1,650 | 2.6 | 312 | 1,962 | 2.6 | 322 | 2,284 | 2.6 | 331 | 2,615 | 2.6 | 341 | 2,956 | 2.6 | 351 | 3,307 | 2.6 | 362 | 3,669 |
| Malanje | Cagandala | | 96.72 | 0.0 | 0 | 0 | 0.9 | 86 | 86 | 1.3 | 132 | 218 | 1.6 | 170 | 388 | 2.0 | 222 | 610 | 2.4 | 265 | 875 | 2.4 | 273 | 1,148 | 1.8 | 217 | 1,365 | 1.8 | 224 | 1,589 | 1.8 | 230 | 1,819 | 1.8 | 237 | 2,056 | 1.8 | 244 | 2,301 | 1.8 | 252 | 2,552 |
| Malanje | Calandula | | 96.72 | 0.0 | 0 | 0 | 1.0 | 104 | 104 | 1.6 | 160 | 264 | 2.0 | 206 | 470 | 2.5 | 269 | 740 | 2.9 | 321 | 1,061 | 2.9 | 331 | 1,391 | 2.2 | 263 | 1,655 | 2.2 | 271 | 1,926 | 2.2 | 279 | 2,205 | 2.2 | 288 | 2,493 | 2.2 | 296 | 2,789 | 2.2 | 305 | 3,094 |
| Malanje | Cambundi-Catembo | | 96.72 | 0.0 | 0 | 0 | 0.7 | 68 | 68 | 1.0 | 105 | 173 | 1.3 | 135 | 308 | 1.6 | 176 | 484 | 1.9 | 210 | 693 | 1.9 | 216 | 910 | 1.4 | 172 | 1,082 | 1.4 | 177 | 1,259 | 1.4 | 183 | 1,442 | 1.4 | 188 | 1,630 | 1.4 | 194 | 1,823 | 1.4 | 200 | 2,023 |
| Malanje | Kahombo | | 96.72 | 0.0 | 0 | 0 | 0.7 | 67 | 67 | 1.0 | 103 | 170 | 1.3 | 133 | 303 | 1.6 | 173 | 476 | 1.8 | 207 | 682 | 1.8 | 213 | 895 | 1.4 | 169 | 1,064 | 1.4 | 174 | 1,239 | 1.4 | 180 | 1,419 | 1.4 | 185 | 1,604 | 1.4 | 191 | 1,794 | 1.4 | 196 | 1,990 |
| Malanje | Kiwaba-Ngozi | | 96.72 | 0.0 | 0 | 0 | 0.4 | 35 | 35 | 0.5 | 55 | 90 | 0.7 | 70 | 160 | 0.8 | 92 | 252 | 1.0 | 110 | 362 | 1.0 | 113 | 475 | 0.8 | 90 | 564 | 0.8 | 92 | 657 | 0.8 | 95 | 752 | 0.8 | 98 | 850 | 0.8 | 101 | 951 | 0.8 | 104 | 1,055 |
| Malanje | Kunda-Dia-Baze | | 96.72 | 0.0 | 0 | 0 | 0.4 | 45 | 45 | 0.7 | 69 | 114 | 0.8 | 89 | 203 | 1.1 | 116 | 319 | 1.2 | 139 | 458 | 1.2 | 143 | 601 | 1.0 | 114 | 715 | 1.0 | 117 | 832 | 1.0 | 121 | 952 | 1.0 | 124 | 1,077 | 1.0 | 128 | 1,205 | 1.0 | 132 | 1,336 |
| Malanje | Luquembo | | 96.72 | 0.0 | 0 | 0 | 0.9 | 92 | 92 | 1.4 | 143 | 235 | 1.7 | 184 | 419 | 2.2 | 240 | 658 | 2.5 | 286 | 944 | 2.5 | 294 | 1,238 | 2.0 | 234 | 1,473 | 2.0 | 241 | 1,714 | 2.0 | 249 | 1,963 | 2.0 | 256 | 2,219 | 2.0 | 264 | 2,482 | 2.0 | 272 | 2,754 |
| Malanje | Malanje | | 96.72 | 0.0 | 0 | 0 | 0.5 | 50 | 50 | 0.8 | 78 | 128 | 0.9 | 100 | 228 | 1.2 | 131 | 359 | 1.4 | 156 | 514 | 1.4 | 160 | 675 | 1.1 | 128 | 802 | 1.1 | 131 | 934 | 1.1 | 135 | 1,069 | 1.1 | 139 | 1,209 | 1.1 | 144 | 1,352 | 1.1 | 148 | 1,500 |
| Malanje | Marimba | | 96.72 | 0.0 | 0 | 0 | 0.3 | 35 | 35 | 0.5 | 54 | 89 | 0.7 | 69 | 158 | 0.8 | 90 | 248 | 1.0 | 108 | 356 | 1.0 | 111 | 467 | 0.7 | 88 | 555 | 0.7 | 91 | 646 | 0.7 | 94 | 740 | 0.7 | 97 | 836 | 0.7 | 99 | 936 | 0.7 | 102 | 1,038 |
| Malanje | Massango | | 96.72 | 0.0 | 0 | 0 | 0.5 | 54 | 54 | 0.8 | 83 | 137 | 1.0 | 107 | 243 | 1.3 | 139 | 383 | 1.5 | 166 | 549 | 1.5 | 171 | 720 | 1.1 | 136 | 856 | 1.1 | 140 | 997 | 1.1 | 145 | 1,141 | 1.1 | 149 | 1,290 | 1.1 | 153 | 1,443 | 1.1 | 158 | 1,601 |
| Malanje | Quela | | 96.72 | 0.0 | 0 | 0 | 0.7 | 73 | 73 | 1.1 | 113 | 186 | 1.4 | 145 | 331 | 1.7 | 189 | 520 | 2.0 | 226 | 746 | 2.0 | 233 | 979 | 1.6 | 185 | 1,164 | 1.6 | 191 | 1,355 | 1.6 | 196 | 1,551 | 1.6 | 202 | 1,753 | 1.6 | 208 | 1,962 | 1.6 | 215 | 2,177 |
| Malanje | Quirima | | 96.72 | 0.0 | 0 | 0 | 0.4 | 40 | 40 | 0.6 | 62 | 101 | 0.8 | 79 | 181 | 1.0 | 103 | 284 | 1.1 | 123 | 408 | 1.1 | 127 | 535 | 0.9 | 101 | 636 | 0.9 | 104 | 740 | 0.9 | 107 | 847 | 0.9 | 111 | 958 | 0.9 | 114 | 1,072 | 0.9 | 117 | 1,189 |
| Moxico | Alto Zambeze | | 105.17 | 0.0 | 0 | 0 | 0.9 | 98 | 98 | 1.4 | 151 | 249 | 1.7 | 195 | 444 | 2.1 | 254 | 698 | 2.5 | 303 | 1,001 | 2.5 | 312 | 1,313 | 1.9 | 248 | 1,561 | 1.9 | 256 | 1,817 | 1.9 | 264 | 2,081 | 1.9 | 271 | 2,352 | 1.9 | 280 | 2,632 | 1.9 | 288 | 2,920 |
| Moxico | Camanongue | | 105.17 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Kameia | | 105.17 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Léua | | 105.17 | 0.0 | 0 | 0 | 0.2 | 27 | 27 | 0.4 | 41 | 68 | 0.5 | 53 | 121 | 0.6 | 69 | 190 | 0.7 | 83 | 273 | 0.7 | 85 | 358 | 0.5 | 68 | 426 | 0.5 | 70 | 496 | 0.5 | 72 | 568 | 0.5 | 74 | 642 | 0.5 | 76 | 718 | 0.5 | 79 | 797 |
| Moxico | Luacano | | 105.17 | 0.0 | 0 | 0 | 0.1 | 14 | 14 | 0.2 | 21 | 35 | 0.2 | 27 | 62 | 0.3 | 35 | 97 | 0.3 | 42 | 139 | 0.3 | 43 | 182 | 0.3 | 34 | 217 | 0.3 | 35 | 252 | 0.3 | 37 | 289 | 0.3 | 38 | 326 | 0.3 | 39 | 365 | 0.3 | 40 | 405 |
| Moxico | Luau | | 105.17 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Luchazes | | 105.17 | 0.0 | 0 | 0 | 0.7 | 76 | 76 | 1.1 | 117 | 193 | 1.3 | 151 | 344 | 1.7 | 197 | 542 | 1.9 | 235 | 777 | 1.9 | 242 | 1,019 | 1.5 | 193 | 1,212 | 1.5 | 199 | 1,410 | 1.5 | 204 | 1,615 | 1.5 | 211 | 1,825 | 1.5 | 217 | 2,042 | 1.5 | 223 | 2,266 |
| Moxico | Lumbala-Nguimbo | | 105.17 | 0.0 | 0 | 0 | 0.4 | 41 | 41 | 0.6 | 63 | 104 | 0.7 | 81 | 185 | 0.9 | 106 | 290 | 1.0 | 126 | 417 | 1.0 | 130 | 546 | 0.8 | 103 | 650 | 0.8 | 106 | 756 | 0.8 | 110 | 866 | 0.8 | 113 | 979 | 0.8 | 116 | 1,095 | 0.8 | 120 | 1,215 |
| Moxico | Moxico | | 105.17 | 0.0 | 0 | 0 | 0.4 | 48 | 48 | 0.7 | 75 | 123 | 0.8 | 96 | 219 | 1.1 | 125 | 345 | 1.2 | 150 | 494 | 1.2 | 154 | 649 | 0.9 | 123 | 771 | 0.9 | 126 | 898 | 0.9 | 130 | 1,028 | 0.9 | 134 | 1,162 | 0.9 | 138 | 1,300 | 0.9 | 142 | 1,442 |
| Namibe | Bibala | | 88.87 | 0.0 | 0 | 0 | 0.4 | 36 | 36 | 0.6 | 55 | 91 | 0.7 | 71 | 162 | 0.9 | 93 | 254 | 1.1 | 110 | 364 | 1.1 | 114 | 478 | 0.8 | 90 | 569 | 0.8 | 93 | 662 | 0.8 | 96 | 758 | 0.8 | 99 | 856 | 0.8 | 102 | 958 | 0.8 | 105 | 1,063 |
| Namibe | Camucuio | | 88.87 | 0.0 | 0 | 0 | 0.1 | 10 | 10 | 0.2 | 15 | 24 | 0.2 | 19 | 43 | 0.2 | 25 | 68 | 0.3 | 30 | 98 | 0.3 | 30 | 128 | 0.2 | 24 | 152 | 0.2 | 25 | 177 | 0.2 | 26 | 203 | 0.2 | 26 | 229 | 0.2 | 27 | 256 | 0.2 | 28 | 285 |
| Namibe | Namibe | | 88.87 | 0.0 | 0 | 0 | 0.2 | 22 | 22 | 0.4 | 35 | 57 | 0.5 | 45 | 102 | 0.6 | 58 | 160 | 0.7 | 69 | 229 | 0.7 | 71 | 301 | 0.5 | 57 | 358 | 0.5 | 59 | 416 | 0.5 | 60 | 477 | 0.5 | 62 | 539 | 0.5 | 64 | 603 | 0.5 | 66 | 669 |
| Namibe | Tômbua | | 88.87 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 | 0.0 | 0 | 1 |
| Namibe | Virei | | 88.87 | 0.0 | 0 | 0 | 0.5 | 48 | 48 | 0.8 | 75 | 123 | 1.0 | 96 | 219 | 1.3 | 125 | 345 | 1.5 | 150 | 494 | 1.5 | 154 | 648 | 1.1 | 123 | 771 | 1.1 | 126 | 897 | 1.1 | 130 | 1,027 | 1.1 | 134 | 1,161 | 1.1 | 138 | 1,299 | 1.1 | 142 | 1,442 |
| Uíge | Ambuíla | | 118.66 | 0.0 | 0 | 0 | 0.2 | 29 | 29 | 0.5 | 63 | 92 | 0.6 | 74 | 167 | 0.5 | 61 | 228 | 0.2 | 33 | 260 | 0.1 | 12 | 272 | 0.0 | 7 | 280 | 0.0 | 7 | 287 | 0.0 | 8 | 295 | 0.0 | 8 | 303 | 0.0 | 8 | 311 | 0.0 | 8 | 319 |
| Uíge | Bembe | | 118.66 | 0.0 | 0 | 0 | 0.9 | 110 | 110 | 1.9 | 237 | 347 | 2.2 | 279 | 627 | 1.7 | 228 | 854 | 0.9 | 124 | 978 | 0.3 | 45 | 1,022 | 0.2 | 27 | 1,050 | 0.2 | 28 | 1,078 | 0.2 | 29 | 1,107 | 0.2 | 30 | 1,137 | 0.2 | 31 | 1,167 | 0.2 | 32 | 1,199 |
| Uíge | Bungo | | 118.66 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Uíge | Damba | | 118.66 | 0.0 | 0 | 0 | 3.3 | 402 | 402 | 6.9 | 869 | 1,271 | 7.9 | 1,023 | 2,294 | 6.2 | 834 | 3,129 | 3.3 | 452 | 3,581 | 1.2 | 163 | 3,744 | 0.7 | 100 | 3,844 | 0.7 | 103 | 3,947 | 0.7 | 106 | 4,053 | 0.7 | 109 | 4,162 | 0.7 | 113 | 4,275 | 0.7 | 116 | 4,391 |
| Uíge | Kangola | | 118.66 | 0.0 | 0 | 0 | 5.0 | 609 | 609 | 10.5 | 1,318 | 1,927 | 12.0 | 1,551 | 3,477 | 9.5 | 1,265 | 4,742 | 5.0 | 686 | 5,428 | 1.7 | 247 | 5,675 | 1.0 | 152 | 5,826 | 1.0 | 156 | 5,982 | 1.0 | 161 | 6,143 | 1.0 | 166 | 6,309 | 1.0 | 171 | 6,479 | 1.0 | 176 | 6,655 |
| Uíge | Maquela do Zombo | | 118.66 | 0.0 | 0 | 0 | 0.3 | 31 | 31 | 0.5 | 67 | 98 | 0.6 | 79 | 177 | 0.5 | 64 | 242 | 0.3 | 35 | 276 | 0.1 | 13 | 289 | 0.1 | 8 | 297 | 0.1 | 8 | 305 | 0.1 | 8 | 313 | 0.1 | 8 | 321 | 0.1 | 9 | 330 | 0.1 | 9 | 339 |
| Uíge | Milunga | | 118.66 | 0.0 | 0 | 0 | 0.3 | 40 | 40 | 0.7 | 87 | 128 | 0.8 | 103 | 230 | 0.6 | 84 | 314 | 0.3 | 45 | 359 | 0.1 | 16 | 376 | 0.1 | 10 | 386 | 0.1 | 10 | 396 | 0.1 | 11 | 407 | 0.1 | 11 | 418 | 0.1 | 11 | 429 | 0.1 | 12 | 440 |
| Uíge | Mucaba | | 118.66 | 0.0 | 0 | 0 | 4.3 | 521 | 521 | 9.0 | 1,128 | 1,649 | 10.2 | 1,328 | 2,977 | 8.1 | 1,083 | 4,059 | 4.3 | 587 | 4,646 | 1.5 | 212 | 4,858 | 0.9 | 130 | 4,988 | 0.9 | 134 | 5,121 | 0.9 | 138 | 5,259 | 0.9 | 142 | 5,401 | 0.9 | 146 | 5,547 | 0.9 | 150 | 5,697 |
| Uíge | Negage | | 118.66 | 0.0 | 0 | 0 | 1.3 | 162 | 162 | 2.8 | 351 | 513 | 3.2 | 413 | 926 | 2.5 | 337 | 1,263 | 1.3 | 183 | 1,446 | 0.5 | 66 | 1,512 | 0.3 | 40 | 1,552 | 0.3 | 42 | 1,594 | 0.3 | 43 | 1,637 | 0.3 | 44 | 1,681 | 0.3 | 45 | 1,726 | 0.3 | 47 | 1,773 |
| Uíge | Nova Esperança | | 118.66 | 0.0 | 0 | 0 | 1.2 | 144 | 144 | 2.5 | 311 | 455 | 2.8 | 367 | 822 | 2.2 | 299 | 1,121 | 1.2 | 162 | 1,283 | 0.4 | 58 | 1,341 | 0.2 | 36 | 1,377 | 0.2 | 37 | 1,414 | 0.2 | 38 | 1,452 | 0.2 | 39 | 1,491 | 0.2 | 40 | 1,531 | 0.2 | 42 | 1,573 |
| Uíge | Puri | | 118.66 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Uíge | Quimbele | | 118.66 | 0.0 | 0 | 0 | 2.4 | 296 | 296 | 5.1 | 641 | 937 | 5.8 | 754 | 1,691 | 4.6 | 615 | 2,306 | 2.4 | 333 | 2,639 | 0.8 | 120 | 2,759 | 0.5 | 74 | 2,833 | 0.5 | 76 | 2,909 | 0.5 | 78 | 2,987 | 0.5 | 81 | 3,068 | 0.5 | 83 | 3,150 | 0.5 | 85 | 3,236 |
| Uíge | Quitexe | | 118.66 | 0.0 | 0 | 0 | 1.4 | 172 | 172 | 3.0 | 373 | 545 | 3.4 | 439 | 984 | 2.7 | 358 | 1,342 | 1.4 | 194 | 1,536 | 0.5 | 70 | 1,606 | 0.3 | 43 | 1,649 | 0.3 | 44 | 1,693 | 0.3 | 45 | 1,738 | 0.3 | 47 | 1,785 | 0.3 | 48 | 1,834 | 0.3 | 50 | 1,883 |
| Uíge | Sanza Pombo | | 118.66 | 0.0 | 0 | 0 | 1.6 | 194 | 194 | 3.3 | 420 | 614 | 3.8 | 494 | 1,108 | 3.0 | 403 | 1,511 | 1.6 | 219 | 1,730 | 0.6 | 79 | 1,809 | 0.3 | 48 | 1,857 | 0.3 | 50 | 1,907 | 0.3 | 51 | 1,958 | 0.3 | 53 | 2,011 | 0.3 | 54 | 2,065 | 0.3 | 56 | 2,121 |
| Uíge | Songo | | 118.66 | 0.0 | 0 | 0 | 0.2 | 24 | 24 | 0.4 | 51 | 75 | 0.5 | 60 | 135 | 0.4 | 49 | 184 | 0.2 | 27 | 210 | 0.1 | 10 | 220 | 0.0 | 6 | 226 | 0.0 | 6 | 232 | 0.0 | 6 | 238 | 0.0 | 6 | 244 | 0.0 | 7 | 251 | 0.0 | 7 | 258 |
| Uíge | Uíge | | 118.66 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Zaire | Cuimba | | 106.53 | 0.0 | 0 | 0 | 0.5 | 56 | 56 | 0.8 | 87 | 144 | 1.0 | 112 | 256 | 1.2 | 146 | 402 | 1.4 | 175 | 577 | 1.4 | 180 | 757 | 1.1 | 143 | 900 | 1.1 | 148 | 1,048 | 1.1 | 152 | 1,200 | 1.1 | 157 | 1,356 | 1.1 | 161 | 1,518 | 1.1 | 166 | 1,684 |
| Zaire | Mbanza Congo | | 106.53 | 0.0 | 0 | 0 | 0.5 | 56 | 56 | 0.8 | 87 | 143 | 1.0 | 112 | 256 | 1.2 | 146 | 402 | 1.4 | 174 | 576 | 1.4 | 180 | 756 | 1.1 | 143 | 899 | 1.1 | 147 | 1,047 | 1.1 | 152 | 1,198 | 1.1 | 156 | 1,355 | 1.1 | 161 | 1,516 | 1.1 | 166 | 1,681 |
| Zaire | Nóqui | | 106.53 | 0.0 | 0 | 0 | 0.5 | 52 | 52 | 0.7 | 80 | 132 | 0.9 | 103 | 235 | 1.1 | 135 | 370 | 1.3 | 161 | 531 | 1.3 | 165 | 696 | 1.0 | 132 | 828 | 1.0 | 136 | 963 | 1.0 | 140 | 1,103 | 1.0 | 144 | 1,247 | 1.0 | 148 | 1,395 | 1.0 | 153 | 1,548 |
| Zaire | Nzeto | | 106.53 | 0.0 | 0 | 0 | 0.4 | 48 | 48 | 0.7 | 74 | 122 | 0.8 | 96 | 218 | 1.0 | 125 | 342 | 1.2 | 149 | 491 | 1.2 | 153 | 644 | 0.9 | 122 | 766 | 0.9 | 125 | 891 | 0.9 | 129 | 1,021 | 0.9 | 133 | 1,154 | 0.9 | 137 | 1,291 | 0.9 | 141 | 1,432 |
| Zaire | Soyo | | 106.53 | 0.0 | 0 | 0 | 0.8 | 84 | 84 | 1.1 | 130 | 214 | 1.4 | 167 | 381 | 1.8 | 218 | 600 | 2.1 | 260 | 860 | 2.1 | 268 | 1,128 | 1.6 | 213 | 1,342 | 1.6 | 220 | 1,561 | 1.6 | 226 | 1,788 | 1.6 | 233 | 2,021 | 1.6 | 240 | 2,261 | 1.6 | 247 | 2,509 |
| Zaire | Tomboco | | 106.53 | 0.0 | 0 | 0 | 0.5 | 50 | 50 | 0.7 | 78 | 128 | 0.9 | 100 | 229 | 1.1 | 131 | 360 | 1.3 | 156 | 516 | 1.3 | 161 | 677 | 1.0 | 128 | 805 | 1.0 | 132 | 937 | 1.0 | 136 | 1,072 | 1.0 | 140 | 1,212 | 1.0 | 144 | 1,356 | 1.0 | 148 | 1,505 |
| **TOTAL (USD)** | **152 372** | | | **0.0** | **0** | **0** | **184.4** | **19,418** | **19,418** | **316.2** | **34,758** | **54,177** | **380.4** | **42,914** | **97,090** | **406.5** | **46,400** | **143,491** | **391.3** | **44,943** | **188,433** | **348.3** | **40,491** | **228,925** | **265.1** | **31,657** | **260,581** | **265.1** | **32,606** | **293,188** | **265.1** | **33,584** | **326,772** | **265.1** | **34,592** | **361,364** | **265.1** | **35,630** | **396,994** | **265.1** | **36,699** | **433,692** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

## ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 NEW ACCESS (x1000) | 2014 COST 2014 (X1000) | 2014 CUM. COST (X1000) | 2015 NEW ACCESS (x1000) | 2015 COST 2015 (X1000) | 2015 CUM. COST (X1000) | 2016 NEW ACCESS (x1000) | 2016 COST 2016 (X1000) | 2016 CUM. COST (X1000) | 2017 NEW ACCESS (x1000) | 2017 COST 2017 (X1000) | 2017 CUM. COST (X1000) | 2018 NEW ACCESS (x1000) | 2018 COST 2018 (X1000) | 2018 CUM. COST (X1000) | 2019 NEW ACCESS (x1000) | 2019 COST 2019 (X1000) | 2019 CUM. COST (X1000) | 2020 NEW ACCESS (x1000) | 2020 COST 2020 (X1000) | 2020 CUM. COST (X1000) | 2021 NEW ACCESS (x1000) | 2021 COST 2021 (X1000) | 2021 CUM. COST (X1000) | 2022 NEW ACCESS (x1000) | 2022 COST 2022 (X1000) | 2022 CUM. COST (X1000) | 2023 NEW ACCESS (x1000) | 2023 COST 2023 (X1000) | 2023 CUM. COST (X1000) | 2024 NEW ACCESS (x1000) | 2024 COST 2024 (X1000) | 2024 CUM. COST (X1000) | 2025 NEW ACCESS (x1000) | 2025 COST 2025 (X1000) | 2025 CUM. COST (X1000) | 2026 NEW ACCESS (x1000) | 2026 COST 2026 (X1000) | 2026 CUM. COST (X1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECTION BY PROVINCE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | 8 | 21 | 108.25 | 0.0 | 0 | 0 | 3.8 | 422 | 422 | 5.7 | 651 | 1,073 | 7.1 | 838 | 1,911 | 9.0 | 1,094 | 3,005 | 10.4 | 1,305 | 4,310 | 10.4 | 1,344 | 5,653 | 8.0 | 1,070 | 6,723 | 8.0 | 1,102 | 7,825 | 8.0 | 1,135 | 8,959 | 8.0 | 1,169 | 10,128 | 8.0 | 1,204 | 11,332 | 8.0 | 1,240 | 12,571 |
| Benguela | 8 | 21 | 92.93 | 0.0 | 0 | 0 | 9.2 | 884 | 884 | 13.9 | 1,367 | 2,251 | 17.3 | 1,759 | 4,010 | 21.9 | 2,295 | 6,306 | 25.4 | 2,738 | 9,044 | 25.4 | 2,820 | 11,863 | 19.6 | 2,244 | 14,108 | 19.6 | 2,312 | 16,419 | 19.6 | 2,381 | 18,800 | 19.6 | 2,452 | 21,252 | 19.6 | 2,526 | 23,778 | 19.6 | 2,602 | 26,380 |
| Bié | 9 | 29 | 100.64 | 0.0 | 0 | 0 | 14.9 | 1,545 | 1,545 | 22.4 | 2,388 | 3,933 | 28.0 | 3,074 | 7,007 | 35.4 | 4,011 | 11,017 | 41.0 | 4,783 | 15,800 | 41.0 | 4,927 | 20,727 | 31.7 | 3,921 | 24,648 | 31.7 | 4,039 | 28,687 | 31.7 | 4,160 | 32,847 | 31.7 | 4,285 | 37,131 | 31.7 | 4,413 | 41,545 | 31.7 | 4,546 | 46,090 |
| Cabinda | 4 | 7 | 91.69 | 0.0 | 0 | 0 | 2.3 | 215 | 215 | 3.4 | 332 | 547 | 4.3 | 428 | 975 | 5.4 | 558 | 1,533 | 6.3 | 665 | 2,198 | 6.3 | 685 | 2,884 | 4.8 | 546 | 3,429 | 4.8 | 562 | 3,991 | 4.8 | 579 | 4,570 | 4.8 | 596 | 5,166 | 4.8 | 614 | 5,780 | 4.8 | 632 | 6,413 |
| Cunene | 6 | 14 | 89.80 | 0.0 | 0 | 0 | 9.8 | 910 | 910 | 14.8 | 1,405 | 2,315 | 18.4 | 1,809 | 4,124 | 23.4 | 2,361 | 6,485 | 27.0 | 2,815 | 9,300 | 27.0 | 2,900 | 12,200 | 20.9 | 2,308 | 14,508 | 20.9 | 2,377 | 16,885 | 20.9 | 2,449 | 19,334 | 20.9 | 2,522 | 21,856 | 20.9 | 2,598 | 24,453 | 20.9 | 2,676 | 27,129 |
| Huambo (2) | 11 | 25 | 104.72 | 0.0 | 0 | 0 | 30.4 | 3,277 | 3,277 | 63.8 | 7,088 | 10,364 | 72.9 | 8,343 | 18,707 | 57.7 | 6,803 | 25,511 | 30.4 | 3,688 | 29,199 | 10.6 | 1,330 | 30,528 | 6.3 | 815 | 31,343 | 6.3 | 840 | 32,183 | 6.3 | 865 | 33,048 | 6.3 | 891 | 33,938 | 6.3 | 917 | 34,856 | 6.3 | 945 | 35,801 |
| Huila | 14 | 45 | 89.00 | 0.0 | 0 | 0 | 20.8 | 1,903 | 1,903 | 31.1 | 2,940 | 4,843 | 38.9 | 3,785 | 8,628 | 49.3 | 4,938 | 13,566 | 57.1 | 5,890 | 19,456 | 57.1 | 6,066 | 25,522 | 44.1 | 4,828 | 30,350 | 44.1 | 4,973 | 35,323 | 44.1 | 5,122 | 40,445 | 44.1 | 5,276 | 45,721 | 44.1 | 5,434 | 51,155 | 44.1 | 5,597 | 56,752 |
| Kuando Kubang | 9 | 21 | 121.62 | 0.0 | 0 | 0 | 2.5 | 315 | 315 | 3.8 | 486 | 801 | 4.7 | 626 | 1,426 | 6.0 | 816 | 2,243 | 6.9 | 974 | 3,216 | 6.9 | 1,003 | 4,219 | 5.3 | 798 | 5,017 | 5.3 | 822 | 5,839 | 5.3 | 847 | 6,686 | 5.3 | 872 | 7,558 | 5.3 | 898 | 8,457 | 5.3 | 925 | 9,382 |
| Kuanza Norte | 9 | 18 | 105.25 | 0.0 | 0 | 0 | 2.8 | 300 | 300 | 4.2 | 464 | 765 | 5.2 | 598 | 1,362 | 6.6 | 780 | 2,142 | 7.6 | 930 | 3,072 | 7.6 | 958 | 4,030 | 5.9 | 762 | 4,792 | 5.9 | 785 | 5,577 | 5.9 | 809 | 6,386 | 5.9 | 833 | 7,219 | 5.9 | 858 | 8,077 | 5.9 | 884 | 8,961 |
| Kuanza Sul | 12 | 23 | 102.99 | 0.0 | 0 | 0 | 12.3 | 1,306 | 1,306 | 18.5 | 2,018 | 3,324 | 23.1 | 2,598 | 5,921 | 29.2 | 3,389 | 9,311 | 33.9 | 4,042 | 13,353 | 33.9 | 4,163 | 17,516 | 26.2 | 3,314 | 20,830 | 26.2 | 3,413 | 24,243 | 26.2 | 3,515 | 27,758 | 26.2 | 3,621 | 31,379 | 26.2 | 3,730 | 35,108 | 26.2 | 3,841 | 38,950 |
| Luanda | 5 | 6 | 88.87 | 0.0 | 0 | 0 | 14.9 | 1,361 | 1,361 | 22.3 | 2,103 | 3,463 | 27.9 | 2,707 | 6,171 | 35.3 | 3,532 | 9,702 | 40.9 | 4,212 | 13,914 | 40.9 | 4,339 | 18,253 | 31.6 | 3,453 | 21,706 | 31.6 | 3,557 | 25,263 | 31.6 | 3,663 | 28,926 | 31.6 | 3,773 | 32,699 | 31.6 | 3,886 | 36,586 | 31.6 | 4,003 | 40,589 |
| Lunda Norte | 9 | 16 | 99.59 | 0.0 | 0 | 0 | 8.4 | 858 | 858 | 12.5 | 1,326 | 2,184 | 15.7 | 1,707 | 3,890 | 19.9 | 2,227 | 6,117 | 23.0 | 2,656 | 8,773 | 23.0 | 2,735 | 11,508 | 17.8 | 2,177 | 13,685 | 17.8 | 2,242 | 15,928 | 17.8 | 2,310 | 18,237 | 17.8 | 2,379 | 20,616 | 17.8 | 2,450 | 23,067 | 17.8 | 2,524 | 25,591 |
| Lunda Sul (2) | 4 | 10 | 122.40 | 0.0 | 0 | 0 | 13.4 | 1,685 | 1,685 | 28.1 | 3,644 | 5,329 | 32.1 | 4,290 | 9,619 | 25.4 | 3,498 | 13,117 | 13.4 | 1,896 | 15,014 | 4.7 | 684 | 15,697 | 2.8 | 419 | 16,117 | 2.8 | 432 | 16,548 | 2.8 | 445 | 16,993 | 2.8 | 458 | 17,451 | 2.8 | 472 | 17,923 | 2.8 | 486 | 18,408 |
| Malanje | 14 | 37 | 96.72 | 0.0 | 0 | 0 | 9.4 | 936 | 936 | 14.1 | 1,447 | 2,383 | 17.6 | 1,863 | 4,246 | 22.3 | 2,430 | 6,676 | 25.8 | 2,898 | 9,575 | 25.8 | 2,985 | 12,560 | 20.0 | 2,376 | 14,936 | 20.0 | 2,447 | 17,383 | 20.0 | 2,521 | 19,904 | 20.0 | 2,596 | 22,500 | 20.0 | 2,674 | 25,175 | 20.0 | 2,755 | 27,929 |
| Moxico | 6 | 20 | 105.17 | 0.0 | 0 | 0 | 2.8 | 303 | 303 | 4.2 | 469 | 772 | 5.2 | 603 | 1,375 | 6.6 | 787 | 2,162 | 7.7 | 939 | 3,101 | 7.7 | 967 | 4,067 | 5.9 | 769 | 4,837 | 5.9 | 793 | 5,629 | 5.9 | 816 | 6,446 | 5.9 | 841 | 7,286 | 5.9 | 866 | 8,152 | 5.9 | 892 | 9,044 |
| Namibe | 5 | 9 | 88.87 | 0.0 | 0 | 0 | 1.3 | 116 | 116 | 1.9 | 179 | 295 | 2.4 | 231 | 526 | 3.0 | 301 | 827 | 3.5 | 359 | 1,186 | 3.5 | 370 | 1,556 | 2.7 | 294 | 1,850 | 2.7 | 303 | 2,153 | 2.7 | 312 | 2,466 | 2.7 | 322 | 2,787 | 2.7 | 331 | 3,118 | 2.7 | 341 | 3,460 |
| Uige (2) | 13 | 31 | 118.66 | 0.0 | 0 | 0 | 22.4 | 2,735 | 2,735 | 47.0 | 5,916 | 8,652 | 53.7 | 6,964 | 15,616 | 42.5 | 5,679 | 21,295 | 22.4 | 3,079 | 24,373 | 7.8 | 1,110 | 25,483 | 4.7 | 680 | 26,163 | 4.7 | 701 | 26,864 | 4.7 | 722 | 27,586 | 4.7 | 744 | 28,330 | 4.7 | 766 | 29,095 | 4.7 | 789 | 29,884 |
| Zaire | 6 | 19 | 106.53 | 0.0 | 0 | 0 | 3.2 | 347 | 347 | 4.7 | 537 | 884 | 5.9 | 691 | 1,575 | 7.5 | 901 | 2,476 | 8.7 | 1,075 | 3,551 | 8.7 | 1,107 | 4,658 | 6.7 | 881 | 5,539 | 6.7 | 908 | 6,447 | 6.7 | 935 | 7,382 | 6.7 | 963 | 8,345 | 6.7 | 992 | 9,337 | 6.7 | 1,022 | 10,358 |
| **TOTAL (USD)** | **152** | **372** | | **0.0** | **0** | **0** | **184** | **19,418** | **19,418** | **316** | **34,758** | **54,177** | **380** | **42,914** | **97,090** | **406** | **46,400** | **143,491** | **391** | **44,943** | **188,433** | **348** | **40,491** | **228,925** | **265** | **31,657** | **260,581** | **265** | **32,606** | **293,188** | **265** | **33,584** | **326,772** | **265** | **34,592** | **361,364** | **265** | **35,630** | **396,994** | **265** | **36,699** | **433,692** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

**ANNEX B2: DETAILED WATER SUPPLY CAPITAL INVESTMENT COSTS, NRWSSP, 2014**

| PROV. | MUN. | COMUNA | CAPITAL UNIT COST (USD/CAP) | 2014 NEW ACCESS (x1000) | 2014 COST (X1000) | 2014 CUM. COST (X1000) | 2015 NEW ACCESS (x1000) | 2015 COST (X1000) | 2015 CUM. COST (X1000) | 2016 NEW ACCESS (x1000) | 2016 COST (X1000) | 2016 CUM. COST (X1000) | 2017 NEW ACCESS (x1000) | 2017 COST (X1000) | 2017 CUM. COST (X1000) | 2018 NEW ACCESS (x1000) | 2018 COST (X1000) | 2018 CUM. COST (X1000) | 2019 NEW ACCESS (x1000) | 2019 COST (X1000) | 2019 CUM. COST (X1000) | 2020 NEW ACCESS (x1000) | 2020 COST (X1000) | 2020 CUM. COST (X1000) | 2021 NEW ACCESS (x1000) | 2021 COST (X1000) | 2021 CUM. COST (X1000) | 2022 NEW ACCESS (x1000) | 2022 COST (X1000) | 2022 CUM. COST (X1000) | 2023 NEW ACCESS (x1000) | 2023 COST (X1000) | 2023 CUM. COST (X1000) | 2024 NEW ACCESS (x1000) | 2024 COST (X1000) | 2024 CUM. COST (X1000) | 2025 NEW ACCESS (x1000) | 2025 COST (X1000) | 2025 CUM. COST (X1000) | 2026 NEW ACCESS (x1000) | 2026 COST (X1000) | 2026 CUM. COST (X1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PILOT PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Huambo | 11 | 25 | 104.72 | 0.0 | 0 | 0 | 30.4 | 3,277 | 3,277 | 63.8 | 7,088 | 10,364 | 72.9 | 8,343 | 18,707 | 57.7 | 6,803 | 25,511 | 30.4 | 3,688 | 29,199 | 10.6 | 1,330 | 30,528 | 6.3 | 815 | 31,343 | 6.3 | 840 | 32,183 | 6.3 | 865 | 33,048 | 6.3 | 891 | 33,938 | 6.3 | 917 | 34,856 | 6.3 | 945 | 35,801 |
| Lunda Sul | 4 | 10 | 122.40 | 0.0 | 0 | 0 | 13.4 | 1,685 | 1,685 | 28.1 | 3,644 | 5,329 | 32.1 | 4,290 | 9,619 | 25.4 | 3,498 | 13,117 | 13.4 | 1,896 | 15,014 | 4.7 | 684 | 15,697 | 2.8 | 419 | 16,117 | 2.8 | 432 | 16,548 | 2.8 | 445 | 16,993 | 2.8 | 458 | 17,451 | 2.8 | 472 | 17,923 | 2.8 | 486 | 18,408 |
| Uige | 13 | 31 | 118.66 | 0.0 | 0 | 0 | 22.4 | 2,735 | 2,735 | 47.0 | 5,916 | 8,652 | 53.7 | 6,964 | 15,616 | 42.5 | 5,679 | 21,295 | 22.4 | 3,079 | 24,373 | 7.8 | 1,110 | 25,483 | 4.7 | 680 | 26,163 | 4.7 | 701 | 26,864 | 4.7 | 722 | 27,586 | 4.7 | 744 | 28,330 | 4.7 | 766 | 29,095 | 4.7 | 789 | 29,884 |
| **TOTAL (USD)** | **28** | **66** | | **0.0** | **0** | **0** | **66** | **7,697** | **7,697** | **139** | **16,648** | **24,345** | **159** | **19,597** | **43,943** | **126** | **15,980** | **59,923** | **66** | **8,663** | **68,586** | **23** | **3,123** | **71,709** | **14** | **1,915** | **73,623** | **14** | **1,972** | **75,595** | **14** | **2,031** | **77,627** | **14** | **2,092** | **79,719** | **14** | **2,155** | **81,874** | **14** | **2,220** | **84,093** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2015 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2016 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2017 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2018 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2019 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2020 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2021 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2022 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2023 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2024 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2025 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2026 (x1000) | CUM. COST (x1000) |
| **PROJECTION BY COMUNA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | Caxito (Dande) | Barra do Dande | 3.02 | 6.0 | 18.1 | 18 | 6.1 | 18.9 | 37 | 6.2 | 19.8 | 57 | 6.3 | 20.9 | 78 | 6.5 | 22.1 | 100 | 6.7 | 23.5 | 123 | 6.9 | 24.9 | 148 | 7.1 | 26.3 | 174 | 7.2 | 27.7 | 202 | 7.4 | 29.1 | 231 | 7.6 | 30.7 | 262 | 7.7 | 32.3 | 294 | 7.9 | 33.9 | 328 |
| Bengo | Caxito (Dande) | Quicabo | 3.02 | 4.6 | 13.8 | 14 | 4.8 | 14.8 | 29 | 5.0 | 16.1 | 45 | 5.4 | 17.8 | 62 | 5.8 | 19.9 | 82 | 6.4 | 22.3 | 105 | 6.9 | 24.8 | 129 | 7.3 | 27.1 | 157 | 7.7 | 29.4 | 186 | 8.1 | 31.9 | 218 | 8.5 | 34.5 | 252 | 8.9 | 37.2 | 289 | 9.3 | 40.0 | 330 |
| Bengo | Caxito (Dande) | Mabubas | 3.02 | 0.0 | 0.0 | 0 | 0.4 | 1.2 | 1 | 1.0 | 3.1 | 4 | 1.7 | 5.5 | 10 | 2.6 | 8.8 | 19 | 3.7 | 12.8 | 31 | 4.7 | 17.0 | 48 | 5.5 | 20.5 | 69 | 6.3 | 24.2 | 93 | 7.2 | 28.2 | 121 | 8.0 | 32.3 | 154 | 8.8 | 36.7 | 190 | 9.6 | 41.3 | 232 |
| Bengo | Catete (Icolo e Ber | Bom Jesus | 3.02 | 2.0 | 6.0 | 6 | 2.2 | 6.9 | 13 | 2.6 | 8.2 | 21 | 3.0 | 9.8 | 31 | 3.5 | 11.9 | 43 | 4.1 | 14.4 | 57 | 4.7 | 17.0 | 74 | 5.2 | 19.3 | 94 | 5.7 | 21.7 | 115 | 6.1 | 24.2 | 139 | 6.6 | 26.8 | 166 | 7.1 | 29.6 | 196 | 7.6 | 32.5 | 228 |
| Bengo | Catete (Icolo e Ber | Kakulo - Kahang | 3.02 | 2.0 | 6.0 | 6 | 2.1 | 6.4 | 12 | 2.1 | 6.9 | 19 | 2.2 | 7.4 | 27 | 2.4 | 8.1 | 35 | 2.5 | 8.9 | 44 | 2.7 | 9.7 | 53 | 2.8 | 10.4 | 64 | 2.9 | 11.2 | 75 | 3.0 | 12.0 | 87 | 3.2 | 12.8 | 100 | 3.3 | 13.7 | 114 | 3.4 | 14.7 | 128 |
| Bengo | Catete (Icolo e Ber | Kassoneca | 3.02 | 1.6 | 4.7 | 5 | 1.7 | 5.3 | 10 | 1.9 | 6.1 | 16 | 2.2 | 7.2 | 23 | 2.5 | 8.5 | 32 | 2.9 | 10.2 | 42 | 3.3 | 11.9 | 54 | 3.6 | 13.3 | 67 | 3.9 | 14.9 | 82 | 4.2 | 16.5 | 99 | 4.5 | 18.3 | 117 | 4.8 | 20.1 | 137 | 5.1 | 22.0 | 159 |
| Bengo | Quissama | Demba Chio | 3.02 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 1.0 | 1 | 0.5 | 1.8 | 3 | 0.8 | 2.9 | 6 | 1.2 | 4.1 | 10 | 1.5 | 5.5 | 16 | 1.8 | 6.6 | 22 | 2.1 | 7.9 | 30 | 2.3 | 9.1 | 39 | 2.6 | 10.5 | 50 | 2.9 | 11.9 | 62 | 3.1 | 13.4 | 75 |
| Bengo | Quissama | Mumbondo | 3.02 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 0.9 | 1 | 0.5 | 1.6 | 3 | 0.8 | 2.6 | 6 | 1.1 | 3.8 | 9 | 1.4 | 5.0 | 14 | 1.6 | 6.1 | 20 | 1.9 | 7.2 | 28 | 2.1 | 8.4 | 36 | 2.4 | 9.6 | 46 | 2.6 | 10.9 | 57 | 2.9 | 12.3 | 69 |
| Bengo | Quissama | Quixinge | 3.02 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.2 | 0.5 | 1 | 0.3 | 0.9 | 2 | 0.4 | 1.4 | 3 | 0.6 | 2.1 | 5 | 0.8 | 2.7 | 8 | 0.9 | 3.3 | 11 | 1.0 | 3.9 | 15 | 1.2 | 4.6 | 20 | 1.3 | 5.2 | 25 | 1.4 | 6.0 | 31 | 1.6 | 6.7 | 38 |
| Bengo | Quissama | Cabo Ledo | 3.02 | 0.0 | 0.0 | 0 | 0.2 | 0.5 | 1 | 0.4 | 1.3 | 2 | 0.7 | 2.4 | 4 | 1.1 | 3.8 | 8 | 1.6 | 5.5 | 14 | 2.0 | 7.3 | 21 | 2.4 | 8.9 | 30 | 2.7 | 10.5 | 40 | 3.1 | 12.2 | 52 | 3.4 | 14.0 | 66 | 3.8 | 15.9 | 82 | 4.2 | 17.9 | 100 |
| Bengo | Ambriz | Bela Vista | 3.02 | 1.5 | 4.4 | 4 | 1.5 | 4.6 | 9 | 1.5 | 4.9 | 14 | 1.6 | 5.2 | 19 | 1.7 | 5.6 | 25 | 1.7 | 6.1 | 31 | 1.8 | 6.6 | 37 | 1.9 | 7.0 | 44 | 2.0 | 7.5 | 52 | 2.0 | 8.0 | 60 | 2.1 | 8.5 | 68 | 2.2 | 9.0 | 77 | 2.2 | 9.5 | 87 |
| Bengo | Nambuangongo | Cage | 3.02 | 0.9 | 2.8 | 3 | 1.3 | 4.0 | 7 | 1.9 | 6.0 | 13 | 2.6 | 8.5 | 21 | 3.5 | 11.8 | 33 | 4.5 | 15.8 | 49 | 5.6 | 20.0 | 69 | 6.4 | 23.6 | 92 | 7.2 | 27.4 | 120 | 8.0 | 31.4 | 151 | 8.8 | 35.6 | 187 | 9.6 | 40.0 | 227 | 10.4 | 44.6 | 271 |
| Bengo | Nambuangongo | Gombe | 3.02 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 1.9 | 3 | 1.0 | 3.4 | 6 | 1.6 | 5.5 | 12 | 2.3 | 7.9 | 20 | 2.9 | 10.5 | 30 | 3.4 | 12.7 | 43 | 3.9 | 15.1 | 58 | 4.4 | 17.5 | 75 | 5.0 | 20.1 | 95 | 5.5 | 22.8 | 118 | 6.0 | 25.7 | 144 |
| Bengo | Nambuangongo | Quicunzo | 3.02 | 1.0 | 3.0 | 3 | 1.2 | 3.8 | 7 | 1.5 | 4.9 | 12 | 1.9 | 6.3 | 18 | 2.4 | 8.2 | 26 | 3.0 | 10.5 | 37 | 3.6 | 12.9 | 50 | 4.0 | 14.9 | 64 | 4.5 | 17.1 | 81 | 4.9 | 19.3 | 101 | 5.4 | 21.7 | 123 | 5.8 | 24.2 | 147 | 6.2 | 26.9 | 174 |
| Bengo | Nambuangongo | Quixico | 3.02 | 0.0 | 0.0 | 0 | 0.1 | 0.5 | 0 | 0.4 | 1.2 | 2 | 0.6 | 2.1 | 4 | 1.0 | 3.3 | 7 | 1.4 | 4.8 | 12 | 1.8 | 6.4 | 18 | 2.1 | 7.8 | 26 | 2.4 | 9.2 | 35 | 2.7 | 10.7 | 46 | 3.0 | 12.2 | 58 | 3.3 | 13.9 | 72 | 3.6 | 15.6 | 88 |
| Bengo | Nambuangongo | Zala | 3.02 | 1.5 | 4.5 | 5 | 1.6 | 4.9 | 9 | 1.7 | 5.5 | 15 | 1.9 | 6.3 | 21 | 2.1 | 7.2 | 28 | 2.4 | 8.3 | 37 | 2.6 | 9.4 | 46 | 2.8 | 10.4 | 57 | 3.0 | 11.5 | 68 | 3.2 | 12.6 | 81 | 3.4 | 13.8 | 95 | 3.6 | 15.0 | 110 | 3.8 | 16.3 | 126 |
| Bengo | Bula - Atumba | Quiage | 3.02 | 0.0 | 0.0 | 0 | 0.2 | 0.5 | 1 | 0.4 | 1.3 | 2 | 0.7 | 2.4 | 4 | 1.1 | 3.8 | 8 | 1.6 | 5.5 | 14 | 2.0 | 7.3 | 21 | 2.4 | 8.9 | 30 | 2.7 | 10.5 | 40 | 3.1 | 12.2 | 52 | 3.4 | 14.0 | 66 | 3.8 | 15.9 | 82 | 4.2 | 17.9 | 100 |
| Bengo | Dembos | Piri | 3.02 | 2.7 | 8.0 | 8 | 2.9 | 9.0 | 17 | 3.3 | 10.4 | 27 | 3.7 | 12.3 | 40 | 4.3 | 14.6 | 54 | 5.0 | 17.4 | 72 | 5.7 | 20.4 | 92 | 6.2 | 22.9 | 115 | 6.7 | 25.6 | 141 | 7.2 | 28.4 | 169 | 7.7 | 31.4 | 200 | 8.3 | 34.5 | 235 | 8.8 | 37.8 | 273 |
| Bengo | Dembos | Paredes | 3.02 | 0.0 | 0.0 | 0 | 0.3 | 0.8 | 1 | 0.6 | 2.1 | 3 | 1.1 | 3.7 | 7 | 1.8 | 6.0 | 13 | 2.5 | 8.6 | 21 | 3.2 | 11.5 | 33 | 3.7 | 13.9 | 47 | 4.3 | 16.4 | 63 | 4.8 | 19.0 | 82 | 5.4 | 21.8 | 104 | 5.9 | 24.8 | 129 | 6.5 | 27.9 | 157 |
| Bengo | Dembos | Coxe | 3.02 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 1.8 | 3 | 1.0 | 3.3 | 6 | 1.5 | 5.2 | 11 | 2.2 | 7.6 | 19 | 2.8 | 10.1 | 29 | 3.3 | 12.2 | 41 | 3.8 | 14.4 | 55 | 4.3 | 16.8 | 72 | 4.7 | 19.2 | 91 | 5.2 | 21.8 | 113 | 5.7 | 24.6 | 138 |
| Bengo | Pango - Aluquém | Cazua | 3.02 | 1.4 | 4.3 | 4 | 1.7 | 5.2 | 10 | 2.1 | 6.6 | 16 | 2.5 | 8.3 | 25 | 3.1 | 10.6 | 35 | 3.8 | 13.3 | 48 | 4.5 | 16.2 | 65 | 5.0 | 18.6 | 83 | 5.5 | 21.2 | 104 | 6.1 | 23.9 | 128 | 6.6 | 26.8 | 155 | 7.1 | 29.8 | 185 | 7.7 | 33.0 | 218 |
| Benguela | Baía Farta | Calohanga | 2.86 | 0.9 | 2.6 | 3 | 0.9 | 2.7 | 5 | 1.0 | 3.0 | 8 | 1.0 | 3.3 | 12 | 1.1 | 3.6 | 15 | 1.2 | 4.0 | 19 | 1.3 | 4.4 | 24 | 1.4 | 4.8 | 28 | 1.4 | 5.2 | 34 | 1.5 | 5.6 | 39 | 1.6 | 6.0 | 45 | 1.6 | 6.5 | 52 | 1.7 | 7.0 | 59 |
| Benguela | Baía Farta | Equimina | 2.86 | 1.8 | 5.1 | 5 | 1.8 | 5.4 | 11 | 1.9 | 5.7 | 16 | 2.0 | 6.1 | 22 | 2.1 | 6.6 | 29 | 2.2 | 7.2 | 36 | 2.3 | 7.8 | 44 | 2.4 | 8.3 | 52 | 2.4 | 8.8 | 61 | 2.5 | 9.4 | 70 | 2.6 | 10.0 | 80 | 2.7 | 10.6 | 91 | 2.8 | 11.3 | 102 |
| Benguela | Baía Farta | Zona Maritima S | 2.86 | 6.5 | 18.6 | 19 | 6.6 | 19.4 | 38 | 6.7 | 20.4 | 58 | 6.9 | 21.5 | 80 | 7.1 | 22.8 | 103 | 7.3 | 24.3 | 127 | 7.6 | 25.8 | 153 | 7.7 | 27.3 | 180 | 7.9 | 28.8 | 209 | 8.1 | 30.3 | 239 | 8.3 | 31.9 | 271 | 8.5 | 33.6 | 305 | 8.7 | 35.4 | 340 |
| Benguela | Lobito | Canata | 2.86 | 8.2 | 23.5 | 23 | 8.3 | 24.4 | 48 | 8.4 | 25.6 | 74 | 8.6 | 26.9 | 100 | 8.8 | 28.4 | 129 | 9.0 | 30.0 | 159 | 9.3 | 31.8 | 191 | 9.5 | 33.4 | 224 | 9.7 | 35.1 | 259 | 9.9 | 36.8 | 296 | 10.0 | 38.7 | 334 | 10.2 | 40.6 | 375 | 10.4 | 42.6 | 418 |
| Benguela | Lobito | Canjala | 2.86 | 0.1 | 0.1 | 0 | 1.3 | 3.8 | 4 | 3.2 | 9.6 | 14 | 5.5 | 17.2 | 31 | 8.4 | 27.2 | 58 | 11.8 | 39.3 | 97 | 15.3 | 52.2 | 149 | 17.9 | 63.0 | 212 | 20.5 | 74.5 | 287 | 23.2 | 86.6 | 373 | 25.8 | 99.3 | 473 | 28.5 | 112.8 | 586 | 31.1 | 126.9 | 712 |
| Benguela | Lobito | Egipto Praia | 2.86 | 1.9 | 5.4 | 5 | 1.9 | 5.7 | 11 | 2.0 | 6.1 | 17 | 2.1 | 6.6 | 24 | 2.2 | 7.1 | 31 | 2.3 | 7.7 | 39 | 2.4 | 8.4 | 47 | 2.5 | 9.0 | 56 | 2.6 | 9.6 | 66 | 2.7 | 10.2 | 76 | 2.8 | 10.9 | 87 | 2.9 | 11.6 | 98 | 3.0 | 12.3 | 111 |
| Benguela | Cubal | Iambala | 2.86 | 3.0 | 8.6 | 9 | 4.3 | 12.7 | 21 | 6.3 | 19.1 | 40 | 8.8 | 27.4 | 68 | 11.9 | 38.3 | 106 | 15.5 | 51.4 | 157 | 19.1 | 65.3 | 223 | 21.9 | 77.1 | 300 | 24.7 | 89.6 | 389 | 27.5 | 102.7 | 492 | 30.3 | 116.5 | 609 | 33.1 | 131.1 | 740 | 35.9 | 146.4 | 886 |
| Benguela | Cubal | Capupa | 2.86 | 8.5 | 24.3 | 24 | 9.1 | 26.9 | 51 | 10.1 | 30.5 | 82 | 11.2 | 35.1 | 117 | 12.7 | 40.9 | 158 | 14.4 | 47.8 | 206 | 16.1 | 55.0 | 261 | 17.4 | 61.3 | 322 | 18.7 | 67.9 | 390 | 20.1 | 74.9 | 465 | 21.4 | 82.2 | 547 | 22.7 | 89.9 | 637 | 24.0 | 98.0 | 735 |
| Benguela | Cubal | Tumbulo | 2.86 | 7.0 | 20.0 | 20 | 8.0 | 23.5 | 44 | 9.4 | 28.7 | 72 | 11.3 | 35.3 | 108 | 13.6 | 43.8 | 151 | 16.3 | 54.1 | 205 | 19.0 | 64.9 | 270 | 21.1 | 74.2 | 345 | 23.1 | 83.9 | 428 | 25.2 | 94.2 | 523 | 27.3 | 105.0 | 628 | 29.4 | 116.4 | 744 | 31.5 | 128.4 | 873 |
| Benguela | Ganda | Babaera | 2.86 | 3.1 | 8.9 | 9 | 4.0 | 11.7 | 21 | 5.3 | 16.1 | 37 | 6.9 | 21.7 | 58 | 9.0 | 29.0 | 87 | 11.4 | 37.9 | 125 | 13.8 | 47.2 | 172 | 15.7 | 55.2 | 228 | 17.5 | 63.6 | 291 | 19.4 | 72.4 | 364 | 21.2 | 81.8 | 445 | 23.1 | 91.6 | 537 | 25.0 | 101.9 | 639 |
| Benguela | Ganda | Chicuma | 2.86 | 4.4 | 12.6 | 13 | 5.0 | 14.7 | 27 | 5.9 | 17.8 | 45 | 7.0 | 21.8 | 67 | 8.4 | 27.0 | 94 | 10.0 | 33.2 | 127 | 11.6 | 39.7 | 167 | 12.9 | 45.4 | 212 | 14.1 | 51.3 | 264 | 15.4 | 57.5 | 321 | 16.6 | 64.0 | 385 | 17.9 | 70.9 | 456 | 19.1 | 78.2 | 534 |
| Benguela | Ganda | Casseque | 2.86 | 5.0 | 14.3 | 14 | 5.3 | 15.7 | 30 | 5.8 | 17.7 | 48 | 6.5 | 20.2 | 68 | 7.3 | 23.4 | 91 | 8.2 | 27.2 | 119 | 9.1 | 31.1 | 150 | 9.8 | 34.6 | 184 | 10.5 | 38.2 | 222 | 11.2 | 42.0 | 264 | 11.9 | 46.0 | 310 | 12.7 | 50.2 | 360 | 13.4 | 54.6 | 415 |
| Benguela | Balombo | Chingongo | 2.86 | 2.8 | 8.1 | 8 | 3.1 | 9.3 | 17 | 3.6 | 11.0 | 28 | 4.2 | 13.3 | 42 | 5.0 | 16.1 | 58 | 5.9 | 19.6 | 77 | 6.8 | 23.2 | 101 | 7.5 | 26.3 | 127 | 8.2 | 29.6 | 157 | 8.8 | 33.1 | 190 | 9.5 | 36.7 | 226 | 10.2 | 40.5 | 267 | 10.9 | 44.5 | 311 |
| Benguela | Balombo | Chindumbo | 2.86 | 7.4 | 21.2 | 21 | 7.8 | 23.1 | 44 | 8.4 | 25.6 | 70 | 9.2 | 28.8 | 99 | 10.2 | 32.8 | 132 | 11.3 | 37.6 | 169 | 12.5 | 42.6 | 212 | 13.3 | 46.9 | 259 | 14.2 | 51.5 | 310 | 15.1 | 56.3 | 366 | 16.0 | 61.4 | 428 | 16.8 | 66.7 | 495 | 17.7 | 72.3 | 567 |
| Benguela | Balombo | Maka-Mambo | 2.86 | 2.6 | 7.5 | 8 | 2.8 | 8.2 | 16 | 3.0 | 9.1 | 25 | 3.3 | 10.3 | 35 | 3.6 | 11.7 | 47 | 4.1 | 13.5 | 60 | 4.5 | 15.3 | 76 | 4.8 | 16.9 | 93 | 5.1 | 18.5 | 111 | 5.4 | 20.3 | 131 | 5.7 | 22.1 | 153 | 6.1 | 24.0 | 177 | 6.4 | 26.0 | 203 |
| Benguela | Bocoio | Chila | 2.86 | 5.8 | 16.6 | 17 | 6.2 | 18.3 | 35 | 6.8 | 20.6 | 55 | 7.5 | 23.4 | 79 | 8.4 | 27.0 | 106 | 9.4 | 31.3 | 137 | 10.5 | 35.8 | 173 | 11.3 | 39.8 | 213 | 12.1 | 43.9 | 257 | 12.9 | 48.2 | 305 | 13.7 | 52.8 | 358 | 14.5 | 57.6 | 415 | 15.3 | 62.6 | 478 |
| Benguela | Bocoio | Monte Belo | 2.86 | 10.7 | 30.6 | 31 | 11.3 | 33.2 | 64 | 12.1 | 36.8 | 101 | 13.2 | 41.3 | 142 | 14.5 | 46.8 | 189 | 16.1 | 53.4 | 242 | 17.7 | 60.4 | 303 | 18.9 | 66.4 | 369 | 20.1 | 72.8 | 442 | 21.3 | 79.5 | 521 | 22.5 | 86.5 | 608 | 23.7 | 93.9 | 702 | 24.9 | 101.6 | 803 |
| Benguela | Bocoio | Cubal do Lumbo | 2.86 | 2.0 | 5.7 | 6 | 2.7 | 8.1 | 14 | 3.9 | 11.7 | 26 | 5.2 | 16.4 | 42 | 7.0 | 22.5 | 64 | 9.0 | 30.0 | 94 | 11.1 | 37.8 | 132 | 12.6 | 44.5 | 177 | 14.2 | 51.6 | 228 | 15.8 | 59.0 | 287 | 17.4 | 66.8 | 354 | 18.9 | 75.0 | 429 | 20.5 | 83.7 | 513 |
| Benguela | Caimbambo | Canhamela | 2.86 | 3.6 | 10.2 | 10 | 3.8 | 11.3 | 21 | 4.2 | 12.8 | 34 | 4.7 | 14.8 | 49 | 5.4 | 17.3 | 66 | 6.1 | 20.3 | 87 | 6.9 | 23.5 | 110 | 7.4 | 26.2 | 136 | 8.0 | 29.1 | 165 | 8.6 | 32.1 | 197 | 9.2 | 35.2 | 233 | 9.7 | 38.6 | 271 | 10.3 | 42.1 | 313 |
| Benguela | Caimbambo | Cayavi | 2.86 | 2.0 | 5.6 | 6 | 2.0 | 5.9 | 12 | 2.1 | 6.4 | 18 | 2.2 | 7.0 | 25 | 2.4 | 7.7 | 33 | 2.6 | 8.5 | 41 | 2.7 | 9.4 | 50 | 2.9 | 10.1 | 61 | 3.0 | 10.9 | 72 | 3.2 | 11.8 | 83 | 3.3 | 12.7 | 96 | 3.4 | 13.6 | 110 | 3.6 | 14.5 | 124 |
| Benguela | Chongoroi | Bolonguera | 2.86 | 5.8 | 16.6 | 17 | 5.9 | 17.4 | 34 | 6.0 | 18.3 | 52 | 6.2 | 19.3 | 72 | 6.4 | 20.5 | 92 | 6.6 | 21.9 | 114 | 6.8 | 23.4 | 137 | 7.0 | 24.7 | 162 | 7.2 | 26.1 | 188 | 7.4 | 27.6 | 216 | 7.6 | 29.1 | 245 | 7.7 | 30.7 | 276 | 7.9 | 32.3 | 308 |
| Bié | Kuito | Trumba | 2.94 | 3.3 | 9.6 | 10 | 4.5 | 13.5 | 23 | 6.3 | 19.6 | 43 | 8.6 | 27.5 | 70 | 11.4 | 37.9 | 108 | 14.8 | 50.4 | 159 | 18.1 | 63.7 | 222 | 20.7 | 74.9 | 297 | 23.3 | 86.8 | 384 | 25.9 | 99.3 | 483 | 28.5 | 112.4 | 596 | 31.0 | 126.3 | 722 | 33.6 | 140.9 | 863 |
| Bié | Kuito | Cambandua | 2.94 | 2.5 | 7.4 | 7 | 3.9 | 11.8 | 19 | 6.0 | 18.7 | 38 | 8.6 | 27.6 | 65 | 11.9 | 39.4 | 105 | 15.7 | 53.6 | 158 | 19.6 | 68.7 | 227 | 22.5 | 81.5 | 309 | 25.5 | 94.9 | 404 | 28.4 | 109.1 | 513 | 31.4 | 124.1 | 637 | 34.4 | 139.9 | 777 | 37.3 | 156.5 | 933 |
| Bié | Kuito | Chicala | 2.94 | 13.1 | 38.4 | 38 | 15.9 | 48.0 | 86 | 20.1 | 62.6 | 149 | 25.3 | 81.3 | 230 | 32.0 | 105.8 | 336 | 39.7 | 135.2 | 471 | 47.4 | 166.3 | 638 | 53.3 | 192.8 | 830 | 59.3 | 220.7 | 1,051 | 65.2 | 250.2 | 1,301 | 71.2 | 281.2 | 1,583 | 77.1 | 313.9 | 1,896 | 83.1 | 348.2 | 2,245 |
| Bié | Kuito | Cunje | 2.94 | 18.5 | 54.4 | 54 | 18.9 | 57.4 | 112 | 19.6 | 61.1 | 173 | 20.4 | 65.6 | 238 | 21.4 | 71.0 | 309 | 22.6 | 77.2 | 387 | 23.8 | 83.7 | 470 | 24.8 | 89.5 | 560 | 25.7 | 95.7 | 655 | 26.6 | 102.1 | 757 | 27.5 | 108.8 | 866 | 28.5 | 115.8 | 982 | 29.4 | 123.2 | 1,105 |
| Bié | Cunhinga (Vouga) | Belo Horizonte | 2.94 | 0.0 | 0.1 | 0 | 0.8 | 2.3 | 2 | 1.9 | 5.8 | 8 | 3.2 | 10.4 | 19 | 5.0 | 16.4 | 35 | 7.0 | 23.8 | 59 | 9.0 | 31.6 | 90 | 10.5 | 38.1 | 128 | 12.1 | 45.1 | 173 | 13.7 | 52.4 | 226 | 15.2 | 60.1 | 286 | 16.8 | 68.2 | 354 | 18.3 | 76.8 | 431 |
| Bié | Chinguar | Cutato | 2.94 | 0.9 | 2.7 | 3 | 1.7 | 5.2 | 8 | 2.9 | 9.1 | 17 | 4.4 | 14.2 | 31 | 6.3 | 20.9 | 52 | 8.5 | 29.1 | 81 | 10.7 | 37.6 | 119 | 12.4 | 44.9 | 164 | 14.1 | 52.6 | 216 | 15.8 | 60.7 | 277 | 17.5 | 69.2 | 346 | 19.2 | 78.2 | 425 | 20.9 | 87.6 | 512 |
| Bié | Chinguar | Cangote | 2.94 | 0.2 | 0.6 | 1 | 0.7 | 2.0 | 3 | 1.3 | 4.2 | 7 | 2.2 | 7.1 | 14 | 3.3 | 10.9 | 25 | 4.6 | 15.6 | 40 | 5.8 | 20.5 | 61 | 6.8 | 24.6 | 86 | 7.8 | 29.0 | 115 | 8.8 | 33.6 | 148 | 9.7 | 38.5 | 187 | 10.7 | 43.7 | 230 | 11.7 | 49.1 | 279 |
| Bié | Andulo | Chivaulo | 2.94 | 0.3 | 0.7 | 1 | 1.2 | 3.7 | 4 | 2.7 | 8.3 | 13 | 4.5 | 14.4 | 27 | 6.8 | 22.5 | 50 | 9.5 | 32.3 | 82 | 12.1 | 42.6 | 125 | 14.2 | 51.3 | 176 | 16.3 | 60.5 | 236 | 18.3 | 70.3 | 307 | 20.4 | 80.5 | 387 | 22.4 | 91.3 | 479 | 24.5 | 102.7 | 581 |
| Bié | Andulo | Cassumbe | 2.94 | 2.3 | 6.8 | 7 | 2.6 | 7.8 | 15 | 3.0 | 9.4 | 24 | 3.5 | 11.4 | 35 | 4.2 | 13.9 | 49 | 5.0 | 17.0 | 66 | 5.8 | 20.2 | 86 | 6.3 | 23.0 | 109 | 6.9 | 25.9 | 135 | 7.5 | 29.0 | 164 | 8.1 | 32.2 | 196 | 8.7 | 35.6 | 232 | 9.3 | 39.2 | 271 |
| Bié | Andulo | Calucinga | 2.94 | 0.1 | 0.2 | 0 | 1.2 | 3.7 | 4 | 3.0 | 9.3 | 13 | 5.2 | 16.7 | 30 | 8.0 | 26.4 | 56 | 11.2 | 38.2 | 94 | 14.4 | 50.6 | 145 | 16.9 | 61.1 | 206 | 19.4 | 72.2 | 278 | 21.9 | 84.0 | 362 | 24.4 | 96.3 | 459 | 26.9 | 109.4 | 568 | 29.4 | 123.1 | 691 |
| Bié | Nharea | Gamba | 2.94 | 1.3 | 3.8 | 4 | 1.5 | 4.6 | 8 | 1.9 | 6.0 | 14 | 2.4 | 7.7 | 22 | 3.0 | 9.9 | 32 | 3.7 | 12.5 | 44 | 4.4 | 15.4 | 60 | 4.9 | 17.8 | 78 | 5.4 | 20.3 | 98 | 6.0 | 23.0 | 121 | 6.5 | 25.8 | 147 | 7.1 | 28.7 | 175 | 7.6 | 31.8 | 207 |
| Bié | Nharea | Caiei | 2.94 | 0.8 | 2.4 | 2 | 1.2 | 3.6 | 6 | 1.7 | 5.4 | 11 | 2.4 | 7.8 | 19 | 3.3 | 11.0 | 30 | 4.4 | 14.9 | 45 | 5.4 | 18.9 | 64 | 6.2 | 22.4 | 86 | 7.0 | 26.0 | 112 | 7.8 | 29.9 | 142 | 8.6 | 33.9 | 176 | 9.4 | 38.2 | 214 | 10.2 | 42.6 | 257 |
| Bié | Nharea | Lúbia | 2.94 | 0.4 | 1.2 | 1 | 0.6 | 1.9 | 3 | 0.9 | 2.9 | 6 | 1.3 | 4.3 | 10 | 1.8 | 6.1 | 16 | 2.4 | 8.3 | 25 | 3.0 | 10.6 | 35 | 3.5 | 12.6 | 48 | 3.9 | 14.7 | 63 | 4.4 | 16.9 | 79 | 4.8 | 19.2 | 99 | 5.3 | 21.6 | 120 | 5.8 | 24.1 | 144 |
| Bié | Nharea | Dando | 2.94 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 1.0 | 1 | 0.6 | 1.8 | 3 | 0.9 | 2.9 | 6 | 1.2 | 4.2 | 10 | 1.6 | 5.5 | 16 | 1.8 | 6.7 | 22 | 2.1 | 7.9 | 30 | 2.4 | 9.2 | 39 | 2.7 | 10.5 | 50 | 2.9 | 11.9 | 62 | 3.2 | 13.4 | 75 |
| Bié | Camacupa | Ringoma | 2.94 | 0.4 | 1.1 | 1 | 0.8 | 2.3 | 3 | 1.3 | 4.2 | 8 | 2.1 | 6.7 | 14 | 3.0 | 10.0 | 24 | 4.1 | 13.9 | 38 | 5.2 | 18.1 | 56 | 6.0 | 21.6 | 78 | 6.8 | 25.4 | 103 | 7.6 | 29.3 | 133 | 8.5 | 33.5 | 166 | 9.3 | 37.9 | 204 | 10.1 | 42.5 | 247 |
| Bié | Camacupa | Umpulo | 2.94 | 0.0 | 0.0 | 0 | 0.4 | 1.3 | 1 | 1.0 | 3.3 | 5 | 1.8 | 5.9 | 10 | 2.8 | 9.4 | 20 | 4.0 | 13.6 | 33 | 5.1 | 18.0 | 51 | 6.0 | 21.8 | 73 | 6.9 | 25.8 | 99 | 7.8 | 30.0 | 129 | 8.7 | 34.4 | 163 | 9.6 | 39.0 | 202 | 10.5 | 43.9 | 246 |
| Bié | Camacupa | St. António da M | 2.94 | 0.0 | 0.0 | 0 | 0.3 | 0.9 | 1 | 0.7 | 2.3 | 3 | 1.3 | 4.1 | 7 | 2.0 | 6.6 | 14 | 2.8 | 9.5 | 23 | 3.6 | 12.7 | 36 | 4.2 | 15.3 | 51 | 4.9 | 18.1 | 70 | 5.5 | 21.0 | 91 | 6.1 | 24.1 | 115 | 6.7 | 27.4 | 142 | 7.4 | 30.9 | 173 |
| Bié | Camacupa | Cuanza | 2.94 | 1.0 | 2.9 | 3 | 1.4 | 4.3 | 7 | 2.0 | 6.3 | 13 | 2.8 | 8.9 | 22 | 3.7 | 12.4 | 35 | 4.9 | 16.6 | 51 | 6.0 | 21.0 | 72 | 6.8 | 24.7 | 97 | 7.7 | 28.7 | 126 | 8.6 | 32.9 | 159 | 9.4 | 37.3 | 196 | 10.3 | 41.9 | 238 | 11.2 | 46.8 | 285 |
| Bié | Cuemba | Munhango | 2.94 | 1.0 | 2.9 | 3 | 1.1 | 3.2 | 6 | 1.1 | 3.6 | 10 | 1.2 | 4.0 | 14 | 1.4 | 4.6 | 18 | 1.5 | 5.2 | 23 | 1.7 | 5.9 | 29 | 1.8 | 6.5 | 36 | 1.9 | 7.2 | 43 | 2.0 | 7.8 | 51 | 2.2 | 8.5 | 59 | 2.3 | 9.3 | 69 | 2.4 | 10.0 | 79 |
| Bié | Cuemba | Luando | 2.94 | 0.8 | 2.2 | 2 | 0.8 | 2.4 | 5 | 0.9 | 2.8 | 7 | 1.0 | 3.2 | 11 | 1.1 | 3.7 | 14 | 1.3 | 4.4 | 19 | 1.4 | 5.0 | 24 | 1.5 | 5.6 | 29 | 1.7 | 6.2 | 35 | 1.8 | 6.8 | 42 | 1.9 | 7.5 | 50 | 2.0 | 8.2 | 58 | 2.1 | 8.9 | 67 |
| Bié | Chitembo | Cachingues | 2.94 | 1.0 | 2.9 | 3 | 1.1 | 3.4 | 6 | 1.3 | 4.1 | 10 | 1.5 | 4.9 | 15 | 1.8 | 6.0 | 21 | 2.2 | 7.4 | 29 | 2.5 | 8.7 | 37 | 2.8 | 9.9 | 47 | 3.0 | 11.2 | 59 | 3.3 | 12.5 | 71 | 3.5 | 13.9 | 85 | 3.8 | 15.4 | 101 | 4.0 | 17.0 | 117 |
| Bié | Chitembo | Mumbue | 2.94 | 2.5 | 7.4 | 7 | 2.6 | 8.0 | 15 | 2.9 | 8.9 | 24 | 3.1 | 10.0 | 34 | 3.5 | 11.5 | 46 | 3.9 | 13.1 | 59 | 4.2 | 14.9 | 74 | 4.6 | 16.5 | 90 | 4.9 | 18.1 | 108 | 5.2 | 19.8 | 128 | 5.5 | 21.6 | 150 | 5.8 | 23.5 | 173 | 6.1 | 25.5 | 199 |
| Bié | Chitembo | Mutumbo | 2.94 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.3 | 0 | 0.2 | 0.5 | 1 | 0.2 | 0.8 | 2 | 0.3 | 1.2 | 3 | 0.4 | 1.6 | 4 | 0.5 | 1.9 | 6 | 0.6 | 2.3 | 9 | 0.7 | 2.6 | 11 | 0.8 | 3.0 | 14 | 0.8 | 3.4 | 18 | 0.

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Huambo (2) | Tchicala-Tcholoha | Samboto | 2.98 | 3.7 | 11.1 | 11 | 4.3 | 13.2 | 24 | 5.5 | 17.5 | 42 | 7.0 | 22.7 | 65 | 8.1 | 27.1 | 92 | 8.7 | 29.9 | 122 | 8.9 | 31.5 | 153 | 9.0 | 32.9 | 186 | 9.1 | 34.4 | 220 | 9.2 | 35.9 | 256 | 9.3 | 37.5 | 294 | 9.5 | 39.1 | 333 | 9.6 | 40.8 | 374 |
| Huambo (2) | Cathihungo | Ciumbu | 2.98 | 8.3 | 24.9 | 25 | 10.0 | 30.8 | 56 | 13.6 | 43.1 | 99 | 17.7 | 57.8 | 157 | 21.0 | 70.4 | 227 | 22.7 | 78.4 | 305 | 23.3 | 82.9 | 388 | 23.6 | 86.7 | 475 | 24.0 | 90.6 | 565 | 24.3 | 94.7 | 660 | 24.7 | 99.0 | 759 | 25.1 | 103.4 | 862 | 25.4 | 108.0 | 971 |
| Huambo (2) | Cathihungo | Cinhama | 2.98 | 0.5 | 1.5 | 1 | 2.2 | 6.6 | 8 | 5.6 | 17.8 | 26 | 9.6 | 31.3 | 57 | 12.8 | 42.8 | 100 | 14.4 | 49.8 | 150 | 15.0 | 53.4 | 203 | 15.3 | 56.3 | 260 | 15.7 | 59.3 | 319 | 16.0 | 62.4 | 381 | 16.4 | 65.6 | 447 | 16.7 | 69.0 | 516 | 17.1 | 72.6 | 589 |
| Huambo (2) | Bailundo | M'bimbi | 2.98 | 2.3 | 6.7 | 7 | 3.1 | 9.6 | 16 | 5.0 | 15.7 | 32 | 7.0 | 22.9 | 55 | 8.7 | 29.2 | 84 | 9.6 | 33.0 | 117 | 9.9 | 35.1 | 152 | 10.0 | 36.8 | 189 | 10.2 | 38.6 | 228 | 10.4 | 40.5 | 268 | 10.6 | 42.4 | 311 | 10.8 | 44.4 | 355 | 10.9 | 46.5 | 402 |
| Huambo (2) | Bailundo | Lunji | 2.98 | 3.9 | 11.6 | 12 | 6.1 | 18.8 | 30 | 10.8 | 34.2 | 65 | 16.2 | 52.6 | 117 | 20.4 | 68.4 | 186 | 22.6 | 78.2 | 264 | 23.4 | 83.3 | 347 | 23.9 | 87.5 | 435 | 24.3 | 91.8 | 526 | 24.8 | 96.4 | 623 | 25.2 | 101.2 | 724 | 25.7 | 106.1 | 830 | 26.2 | 111.3 | 941 |
| Huambo (2) | Bailundo | Luvemba | 2.98 | 5.2 | 15.4 | 15 | 7.1 | 21.9 | 37 | 11.3 | 35.7 | 73 | 16.0 | 52.2 | 125 | 19.8 | 66.3 | 191 | 21.7 | 75.2 | 267 | 22.4 | 79.9 | 346 | 22.8 | 83.8 | 430 | 23.3 | 87.8 | 518 | 23.7 | 92.1 | 610 | 24.1 | 96.5 | 707 | 24.5 | 101.1 | 808 | 24.9 | 105.9 | 914 |
| Huambo (2) | Bailundo | Hengue (Calulo) | 2.98 | 0.2 | 0.5 | 0 | 2.0 | 6.3 | 7 | 6.0 | 18.9 | 26 | 10.5 | 34.2 | 60 | 14.0 | 47.1 | 107 | 15.9 | 55.0 | 162 | 16.6 | 59.0 | 221 | 17.0 | 62.2 | 283 | 17.4 | 65.6 | 349 | 17.8 | 69.1 | 418 | 18.1 | 72.7 | 491 | 18.5 | 76.5 | 567 | 18.9 | 80.5 | 648 |
| Huambo (2) | Caála | Cuima | 2.98 | 6.5 | 19.4 | 19 | 8.6 | 26.3 | 46 | 12.9 | 40.8 | 87 | 17.8 | 58.1 | 145 | 21.8 | 73.0 | 218 | 23.8 | 82.3 | 300 | 24.5 | 87.4 | 387 | 25.0 | 91.6 | 479 | 25.4 | 95.9 | 575 | 25.8 | 100.5 | 675 | 26.3 | 105.2 | 781 | 26.7 | 110.2 | 891 | 27.1 | 115.3 | 1,006 |
| Huambo (2) | Caála | Katata | 2.98 | 0.9 | 2.8 | 3 | 2.0 | 6.1 | 9 | 4.2 | 13.1 | 22 | 6.6 | 21.6 | 44 | 8.6 | 28.9 | 73 | 9.6 | 33.3 | 106 | 10.0 | 35.6 | 141 | 10.2 | 37.4 | 179 | 10.4 | 39.4 | 218 | 10.6 | 41.4 | 260 | 10.9 | 43.5 | 303 | 11.1 | 45.7 | 349 | 11.3 | 48.0 | 397 |
| Huambo (2) | Caála | Calenga | 2.98 | 6.5 | 19.3 | 19 | 7.5 | 23.0 | 42 | 9.6 | 30.4 | 73 | 12.1 | 39.3 | 112 | 14.0 | 47.0 | 159 | 15.0 | 51.9 | 211 | 15.4 | 54.7 | 266 | 15.6 | 57.1 | 323 | 15.8 | 59.6 | 382 | 16.0 | 62.2 | 445 | 16.2 | 65.0 | 509 | 16.4 | 67.8 | 577 | 16.6 | 70.7 | 648 |
| Huambo (2) | Ecunha | Quipeio | 2.98 | 3.9 | 11.7 | 12 | 5.0 | 15.3 | 27 | 7.2 | 22.8 | 50 | 9.7 | 31.8 | 82 | 11.8 | 39.5 | 121 | 12.8 | 44.3 | 165 | 13.2 | 47.0 | 212 | 13.4 | 49.2 | 261 | 13.6 | 51.5 | 313 | 13.9 | 53.9 | 367 | 14.1 | 56.4 | 423 | 14.3 | 59.0 | 482 | 14.5 | 61.7 | 544 |
| Huambo (2) | Ucuma | Mundundo | 2.98 | 1.0 | 3.0 | 3 | 1.4 | 4.3 | 7 | 2.2 | 6.9 | 14 | 3.1 | 9.9 | 24 | 3.8 | 12.6 | 37 | 4.1 | 14.3 | 51 | 4.3 | 15.1 | 66 | 4.3 | 15.9 | 82 | 4.4 | 16.7 | 99 | 4.5 | 17.4 | 116 | 4.6 | 18.3 | 134 | 4.6 | 19.1 | 154 | 4.7 | 20.0 | 174 |
| Huambo (2) | Longonjo | Lepi | 2.98 | 1.5 | 4.5 | 4 | 2.2 | 6.9 | 11 | 3.8 | 12.0 | 23 | 5.6 | 18.2 | 42 | 7.0 | 23.5 | 65 | 7.7 | 26.7 | 92 | 8.0 | 28.5 | 120 | 8.2 | 29.9 | 150 | 8.3 | 31.4 | 182 | 8.5 | 32.9 | 214 | 8.6 | 34.5 | 249 | 8.8 | 36.2 | 285 | 8.9 | 37.9 | 323 |
| Huambo (2) | Longonjo | Katavola | 2.98 | 2.9 | 8.6 | 9 | 3.1 | 9.7 | 18 | 3.7 | 11.6 | 30 | 4.3 | 13.9 | 44 | 4.7 | 15.9 | 60 | 5.0 | 17.3 | 77 | 5.1 | 18.1 | 95 | 5.1 | 18.8 | 114 | 5.2 | 19.6 | 134 | 5.2 | 20.4 | 154 | 5.3 | 21.2 | 175 | 5.3 | 22.1 | 197 | 5.4 | 23.0 | 220 |
| Huambo (2) | Longonjo | Chilata (Ngombe | 2.98 | 1.1 | 3.4 | 3 | 2.1 | 6.6 | 10 | 4.2 | 13.4 | 23 | 6.6 | 21.5 | 45 | 8.5 | 28.5 | 73 | 9.5 | 32.8 | 106 | 9.8 | 35.1 | 141 | 10.1 | 36.9 | 178 | 10.3 | 38.8 | 217 | 10.5 | 40.7 | 258 | 10.7 | 42.8 | 300 | 10.9 | 44.9 | 345 | 11.1 | 47.1 | 392 |
| Huambo (2) | Mungo | Kambuengo | 2.98 | 2.3 | 6.8 | 7 | 3.6 | 11.0 | 18 | 6.3 | 19.9 | 38 | 9.4 | 30.6 | 68 | 11.8 | 39.8 | 108 | 13.1 | 45.4 | 154 | 13.6 | 48.4 | 202 | 13.9 | 50.8 | 253 | 14.1 | 53.4 | 306 | 14.4 | 56.0 | 362 | 14.7 | 58.8 | 421 | 14.9 | 61.6 | 483 | 15.2 | 64.6 | 547 |
| Huambo (2) | Londuimbali | Kumbila (Katuku | 2.98 | 1.6 | 4.7 | 5 | 2.0 | 6.1 | 11 | 2.8 | 8.8 | 20 | 3.7 | 12.1 | 32 | 4.5 | 15.0 | 47 | 4.9 | 16.8 | 64 | 5.0 | 17.8 | 81 | 5.1 | 18.6 | 100 | 5.2 | 19.5 | 119 | 5.2 | 20.4 | 140 | 5.3 | 21.3 | 161 | 5.4 | 22.3 | 183 | 5.5 | 23.3 | 207 |
| Huambo (2) | Londuimbali | Galanga | 2.98 | 4.8 | 14.4 | 14 | 5.7 | 17.6 | 32 | 7.6 | 24.0 | 56 | 9.7 | 31.6 | 88 | 11.4 | 38.2 | 126 | 12.3 | 42.4 | 168 | 12.6 | 44.7 | 213 | 12.8 | 46.8 | 260 | 12.9 | 48.9 | 309 | 13.1 | 51.0 | 360 | 13.3 | 53.3 | 413 | 13.5 | 55.7 | 469 | 13.7 | 58.1 | 527 |
| Huambo (2) | Londuimbali | Ussoke | 2.98 | 1.0 | 3.0 | 3 | 1.5 | 4.7 | 8 | 2.6 | 8.3 | 16 | 3.9 | 12.7 | 29 | 4.9 | 16.4 | 45 | 5.4 | 18.7 | 64 | 5.6 | 19.9 | 84 | 5.7 | 20.9 | 104 | 5.8 | 21.9 | 126 | 5.9 | 23.0 | 149 | 6.0 | 24.1 | 174 | 6.1 | 25.3 | 199 | 6.2 | 26.5 | 225 |
| Huambo (2) | Londuimbali | Alto Hama | 2.98 | 9.0 | 26.8 | 27 | 9.6 | 29.4 | 56 | 10.7 | 33.9 | 90 | 12.1 | 39.3 | 129 | 13.1 | 44.1 | 174 | 13.7 | 47.3 | 221 | 13.9 | 49.4 | 270 | 14.0 | 51.3 | 322 | 14.1 | 53.3 | 375 | 14.2 | 55.4 | 430 | 14.3 | 57.5 | 488 | 14.5 | 59.7 | 547 | 14.6 | 62.0 | 609 |
| Huambo (2) | Tchindjenje | Tchiaka | 2.98 | 2.0 | 5.8 | 6 | 2.4 | 7.4 | 13 | 3.3 | 10.6 | 24 | 4.4 | 14.4 | 38 | 5.3 | 17.7 | 56 | 5.7 | 19.7 | 76 | 5.9 | 20.9 | 96 | 6.0 | 21.9 | 118 | 6.1 | 22.9 | 141 | 6.1 | 23.9 | 165 | 6.2 | 25.0 | 190 | 6.3 | 26.1 | 216 | 6.4 | 27.3 | 244 |
| Huila | Lubango | Arrimba | 2.82 | 4.4 | 12.4 | 12 | 5.3 | 15.3 | 28 | 6.6 | 19.7 | 47 | 8.2 | 25.2 | 73 | 10.2 | 32.5 | 105 | 12.6 | 41.2 | 146 | 15.0 | 50.5 | 197 | 16.8 | 58.3 | 255 | 18.6 | 66.6 | 322 | 20.5 | 75.4 | 397 | 22.3 | 84.6 | 482 | 24.1 | 94.3 | 576 | 26.0 | 104.5 | 681 |
| Huila | Lubango | Huila | 2.82 | 13.8 | 38.9 | 39 | 14.8 | 43.1 | 82 | 16.4 | 49.3 | 131 | 18.5 | 56.9 | 188 | 21.0 | 66.7 | 255 | 23.9 | 78.4 | 333 | 26.9 | 90.7 | 424 | 29.2 | 101.3 | 525 | 31.4 | 112.5 | 638 | 33.7 | 124.2 | 762 | 36.0 | 136.6 | 899 | 38.3 | 149.6 | 1,048 | 40.6 | 163.3 | 1,212 |
| Huila | Lubango | Quilenda | 2.82 | 4.0 | 11.2 | 11 | 4.4 | 12.9 | 24 | 5.1 | 15.2 | 39 | 5.9 | 18.3 | 58 | 7.0 | 22.1 | 80 | 8.2 | 26.8 | 107 | 9.4 | 31.7 | 138 | 10.3 | 35.9 | 174 | 11.3 | 40.3 | 214 | 12.2 | 45.0 | 259 | 13.2 | 49.9 | 309 | 14.1 | 55.1 | 364 | 15.0 | 60.5 | 425 |
| Huila | Lubango | Hoque | 2.82 | 4.8 | 13.5 | 13 | 6.4 | 18.5 | 32 | 8.7 | 26.2 | 58 | 11.7 | 36.1 | 94 | 15.4 | 49.1 | 143 | 19.8 | 64.8 | 208 | 24.1 | 81.4 | 290 | 27.5 | 95.5 | 385 | 30.9 | 110.4 | 495 | 34.2 | 126.1 | 621 | 37.6 | 142.6 | 764 | 40.9 | 160.0 | 924 | 44.3 | 178.3 | 1,102 |
| Huila | Cacula | Vite-Vivali | 2.82 | 2.7 | 7.6 | 8 | 2.8 | 8.2 | 16 | 3.0 | 9.1 | 25 | 3.3 | 10.2 | 35 | 3.6 | 11.6 | 47 | 4.0 | 13.2 | 60 | 4.4 | 14.9 | 75 | 4.7 | 16.4 | 91 | 5.0 | 18.0 | 109 | 5.3 | 19.7 | 129 | 5.6 | 21.4 | 150 | 5.9 | 23.2 | 174 | 6.2 | 25.1 | 199 |
| Huila | Cacula | Tchituto | 2.82 | 0.5 | 1.4 | 1 | 1.0 | 2.8 | 4 | 1.6 | 4.9 | 9 | 2.5 | 7.7 | 17 | 3.6 | 11.4 | 28 | 4.9 | 15.9 | 44 | 6.1 | 20.6 | 65 | 7.1 | 24.6 | 89 | 8.1 | 28.8 | 118 | 9.0 | 33.3 | 151 | 10.0 | 38.0 | 189 | 11.0 | 42.9 | 232 | 12.0 | 48.1 | 281 |
| Huila | Cacula | Tchiquaqueia | 2.82 | 2.0 | 5.6 | 6 | 2.2 | 6.4 | 12 | 2.5 | 7.5 | 20 | 2.9 | 8.9 | 28 | 3.4 | 10.7 | 39 | 3.9 | 12.8 | 52 | 4.5 | 15.1 | 67 | 4.9 | 17.0 | 84 | 5.3 | 19.0 | 103 | 5.7 | 21.2 | 124 | 6.2 | 23.4 | 148 | 6.6 | 25.8 | 173 | 7.0 | 28.3 | 202 |
| Huila | Chibia | Jau | 2.82 | 6.8 | 19.3 | 19 | 6.9 | 20.2 | 39 | 7.1 | 21.3 | 61 | 7.3 | 22.6 | 83 | 7.6 | 24.2 | 108 | 7.9 | 25.9 | 133 | 8.2 | 27.7 | 161 | 8.5 | 29.4 | 191 | 8.7 | 31.2 | 222 | 9.0 | 33.0 | 255 | 9.2 | 34.9 | 290 | 9.4 | 36.9 | 327 | 9.7 | 39.0 | 365 |
| Huila | Caconda | Gungue | 2.82 | 4.7 | 13.1 | 13 | 6.0 | 17.5 | 31 | 8.1 | 24.1 | 55 | 10.6 | 32.7 | 88 | 13.8 | 44.0 | 132 | 17.6 | 57.6 | 189 | 21.3 | 71.9 | 261 | 24.2 | 84.1 | 345 | 27.1 | 97.0 | 442 | 30.0 | 110.6 | 553 | 32.9 | 124.9 | 678 | 35.8 | 139.9 | 817 | 38.7 | 155.8 | 973 |
| Huila | Caconda | Uaba | 2.82 | 6.8 | 19.1 | 19 | 7.7 | 22.3 | 41 | 9.0 | 27.0 | 68 | 10.7 | 33.1 | 102 | 12.9 | 41.0 | 142 | 15.4 | 50.4 | 193 | 17.9 | 60.3 | 253 | 19.8 | 68.8 | 322 | 21.7 | 77.8 | 400 | 23.7 | 87.2 | 487 | 25.6 | 97.2 | 584 | 27.5 | 107.6 | 692 | 29.5 | 118.6 | 810 |
| Huila | Caconda | Cusse | 2.82 | 8.7 | 24.6 | 25 | 9.5 | 27.5 | 52 | 10.6 | 31.8 | 84 | 12.0 | 37.1 | 121 | 13.8 | 44.0 | 165 | 15.9 | 52.1 | 217 | 18.0 | 60.7 | 278 | 19.6 | 68.1 | 346 | 21.2 | 75.9 | 422 | 22.8 | 84.1 | 506 | 24.4 | 92.8 | 599 | 26.1 | 101.9 | 701 | 27.7 | 111.4 | 812 |
| Huila | Caconda | Mundina | 2.82 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.2 | 0.5 | 1 | 0.3 | 0.9 | 2 | 0.5 | 1.5 | 3 | 0.7 | 2.1 | 5 | 0.8 | 2.8 | 8 | 1.0 | 3.4 | 12 | 1.1 | 4.1 | 16 | 1.3 | 4.7 | 20 | 1.4 | 5.4 | 26 | 1.6 | 6.1 | 32 | 1.7 | 6.9 | 39 |
| Huila | Caconda | Bandeira | 2.82 | 0.5 | 1.4 | 1 | 0.6 | 1.7 | 3 | 0.8 | 2.2 | 5 | 0.9 | 2.9 | 8 | 1.2 | 3.7 | 12 | 1.5 | 4.8 | 17 | 1.7 | 5.8 | 23 | 1.9 | 6.7 | 29 | 2.2 | 7.7 | 37 | 2.4 | 8.7 | 46 | 2.6 | 9.8 | 56 | 2.8 | 10.9 | 66 | 3.0 | 12.1 | 79 |
| Huila | Caluquembe | Calepi | 2.82 | 1.3 | 3.7 | 4 | 1.4 | 4.0 | 8 | 1.5 | 4.4 | 12 | 1.6 | 4.9 | 17 | 1.8 | 5.6 | 23 | 1.9 | 6.3 | 29 | 2.1 | 7.1 | 36 | 2.3 | 7.8 | 44 | 2.4 | 8.6 | 52 | 2.5 | 9.3 | 62 | 2.7 | 10.1 | 72 | 2.8 | 11.0 | 83 | 2.9 | 11.9 | 95 |
| Huila | Caluquembe | Negola | 2.82 | 5.5 | 15.6 | 16 | 6.0 | 17.3 | 33 | 6.6 | 19.7 | 53 | 7.4 | 22.7 | 75 | 8.3 | 26.5 | 102 | 9.5 | 31.0 | 133 | 10.6 | 35.8 | 169 | 11.5 | 39.9 | 209 | 12.4 | 44.3 | 253 | 13.3 | 48.9 | 302 | 14.1 | 53.7 | 356 | 15.0 | 58.7 | 414 | 15.9 | 64.0 | 478 |
| Huila | Caluquembe | Camacuio | 2.82 | 0.0 | 0.0 | 0 | 0.4 | 1.2 | 1 | 1.0 | 3.0 | 4 | 1.8 | 5.4 | 10 | 2.7 | 8.6 | 18 | 3.8 | 12.5 | 31 | 4.9 | 16.6 | 47 | 5.8 | 20.0 | 67 | 6.6 | 23.7 | 91 | 7.5 | 27.5 | 118 | 8.3 | 31.6 | 150 | 9.2 | 35.9 | 186 | 10.0 | 40.4 | 226 |
| Huila | Quilengues | Impulo | 2.82 | 1.5 | 4.2 | 4 | 1.9 | 5.6 | 10 | 2.6 | 7.7 | 17 | 3.3 | 10.3 | 28 | 4.3 | 13.8 | 42 | 5.5 | 18.0 | 60 | 6.7 | 22.5 | 82 | 7.6 | 26.3 | 108 | 8.5 | 30.3 | 139 | 9.4 | 34.5 | 173 | 10.2 | 38.9 | 212 | 11.1 | 43.6 | 256 | 12.0 | 48.5 | 304 |
| Huila | Quilengues | Dinde | 2.82 | 5.5 | 15.5 | 16 | 5.9 | 17.2 | 33 | 6.5 | 19.6 | 52 | 7.3 | 22.5 | 75 | 8.3 | 26.3 | 101 | 9.4 | 30.8 | 132 | 10.6 | 35.6 | 168 | 11.4 | 39.7 | 207 | 12.3 | 44.0 | 251 | 13.2 | 48.6 | 300 | 14.1 | 53.3 | 353 | 14.9 | 58.4 | 412 | 15.8 | 63.7 | 475 |
| Huila | Kuvango | Galangue | 2.82 | 8.9 | 25.2 | 25 | 9.5 | 27.7 | 53 | 10.4 | 31.2 | 84 | 11.5 | 35.5 | 120 | 12.9 | 41.1 | 161 | 14.5 | 47.6 | 208 | 16.2 | 54.5 | 263 | 17.4 | 60.6 | 323 | 18.7 | 66.9 | 390 | 20.0 | 73.5 | 464 | 21.2 | 80.5 | 544 | 22.5 | 87.8 | 632 | 23.7 | 95.5 | 728 |
| Huila | Kuvango | Indungo | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.3 | 1 | 0.2 | 0.5 | 1 | 0.2 | 0.7 | 2 | 0.3 | 0.9 | 3 | 0.3 | 1.1 | 4 | 0.4 | 1.4 | 5 | 0.4 | 1.6 | 7 | 0.5 | 1.8 | 9 | 0.5 | 2.0 | 11 | 0.6 | 2.3 | 13 |
| Huila | Kuvango | Candumbo | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.3 | 1 | 0.1 | 0.4 | 1 | 0.1 | 0.5 | 2 | 0.2 | 0.6 | 2 | 0.2 | 0.6 | 3 | 0.2 | 0.7 | 4 | 0.2 | 0.8 | 4 | 0.2 | 0.9 | 5 |
| Huila | Quipungo | Cainda | 2.82 | 0.5 | 1.4 | 1 | 1.0 | 3.0 | 4 | 1.8 | 5.5 | 10 | 2.8 | 8.7 | 19 | 4.1 | 13.0 | 32 | 5.6 | 18.2 | 50 | 7.0 | 23.7 | 74 | 8.2 | 28.3 | 102 | 9.3 | 33.2 | 135 | 10.4 | 38.4 | 174 | 11.6 | 43.8 | 217 | 12.7 | 49.6 | 267 | 13.8 | 55.6 | 323 |
| Huila | Quipungo | Hombo | 2.82 | 8.5 | 24.0 | 24 | 8.9 | 25.8 | 50 | 9.4 | 28.2 | 78 | 10.1 | 31.2 | 109 | 11.0 | 34.9 | 144 | 12.0 | 39.3 | 184 | 13.0 | 43.9 | 227 | 13.8 | 48.0 | 275 | 14.6 | 52.2 | 328 | 15.4 | 56.7 | 384 | 16.2 | 61.4 | 446 | 17.0 | 66.3 | 512 | 17.7 | 71.4 | 583 |
| Huila | Quipungo | Chicungo | 2.82 | 2.1 | 5.8 | 6 | 3.1 | 9.0 | 15 | 4.6 | 13.9 | 29 | 6.6 | 20.3 | 49 | 9.0 | 28.6 | 78 | 11.8 | 38.8 | 116 | 14.7 | 49.4 | 166 | 16.9 | 58.5 | 224 | 19.0 | 68.1 | 292 | 21.2 | 78.2 | 371 | 23.4 | 88.8 | 459 | 25.6 | 100.0 | 560 | 27.8 | 111.8 | 671 |
| Huila | Quipungo | Tchiconco | 2.82 | 1.5 | 4.2 | 4 | 2.4 | 7.1 | 11 | 3.8 | 11.5 | 23 | 5.6 | 17.2 | 40 | 7.8 | 24.7 | 65 | 10.3 | 33.8 | 98 | 12.9 | 43.4 | 142 | 14.9 | 51.6 | 194 | 16.8 | 60.2 | 254 | 18.8 | 69.3 | 323 | 20.8 | 78.9 | 402 | 22.8 | 89.0 | 491 | 24.7 | 99.6 | 590 |
| Huila | Matala | Mulondo | 2.82 | 2.3 | 6.4 | 6 | 2.8 | 8.2 | 15 | 3.7 | 11.1 | 26 | 4.8 | 14.7 | 40 | 6.1 | 19.5 | 60 | 7.7 | 25.3 | 85 | 9.3 | 31.4 | 116 | 10.5 | 36.5 | 153 | 11.7 | 42.0 | 195 | 13.0 | 47.8 | 243 | 14.2 | 53.8 | 297 | 15.4 | 60.2 | 357 | 16.6 | 67.0 | 424 |
| Huila | Matala | Capelongo | 2.82 | 12.0 | 33.8 | 34 | 15.3 | 44.6 | 78 | 20.4 | 61.0 | 139 | 26.6 | 82.2 | 222 | 34.6 | 110.0 | 332 | 43.8 | 143.5 | 475 | 53.1 | 178.9 | 654 | 60.2 | 209.0 | 863 | 67.3 | 240.8 | 1,104 | 74.4 | 274.3 | 1,378 | 81.6 | 309.5 | 1,688 | 88.7 | 346.7 | 2,034 | 95.8 | 385.8 | 2,420 |
| Huila | Matala | Micosse | 2.82 | 5.5 | 15.5 | 16 | 5.9 | 17.1 | 33 | 6.4 | 19.3 | 52 | 7.1 | 22.0 | 74 | 8.0 | 25.5 | 99 | 9.1 | 29.7 | 129 | 10.1 | 34.0 | 163 | 10.9 | 37.8 | 201 | 11.7 | 41.8 | 243 | 12.5 | 46.0 | 289 | 13.3 | 50.4 | 339 | 14.1 | 55.0 | 394 | 14.9 | 59.8 | 454 |
| Huila | Matala | Sequendiva | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.4 | 1 | 0.2 | 0.6 | 1 | 0.2 | 0.8 | 2 | 0.3 | 0.9 | 3 | 0.3 | 1.1 | 4 | 0.3 | 1.3 | 5 | 0.4 | 1.5 | 7 | 0.4 | 1.7 | 9 | 0.5 | 1.9 | 10 |
| Huila | Chicomba | Quê | 2.82 | 5.5 | 15.5 | 16 | 5.9 | 17.2 | 33 | 6.5 | 19.5 | 52 | 7.3 | 22.5 | 75 | 8.3 | 26.3 | 101 | 9.4 | 30.7 | 132 | 10.5 | 35.4 | 167 | 11.4 | 39.5 | 207 | 12.3 | 43.8 | 251 | 13.1 | 48.4 | 299 | 14.0 | 53.1 | 352 | 14.9 | 58.1 | 410 | 15.7 | 63.3 | 473 |
| Huila | Chicomba | Vila Real | 2.82 | 0.5 | 1.4 | 1 | 0.5 | 1.5 | 3 | 0.5 | 1.5 | 4 | 0.5 | 1.6 | 6 | 0.5 | 1.7 | 8 | 0.6 | 1.8 | 10 | 0.6 | 1.9 | 12 | 0.6 | 2.1 | 14 | 0.6 | 2.2 | 16 | 0.6 | 2.3 | 18 | 0.6 | 2.4 | 20 | 0.6 | 2.5 | 23 | 0.7 | 2.6 | 26 |
| Huila | Jamba | Kussuva | 2.82 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 0.9 | 1 | 0.5 | 1.7 | 3 | 0.8 | 2.6 | 6 | 1.2 | 3.8 | 9 | 1.5 | 5.1 | 15 | 1.8 | 6.2 | 21 | 2.0 | 7.3 | 28 | 2.3 | 8.5 | 36 | 2.6 | 9.7 | 46 | 2.8 | 11.0 | 57 | 3.1 | 12.4 | 70 |
| Huila | Jamba | Dongo | 2.82 | 2.8 | 7.8 | 8 | 3.5 | 10.1 | 18 | 4.5 | 13.5 | 31 | 5.8 | 17.9 | 49 | 7.4 | 23.7 | 73 | 9.4 | 30.6 | 104 | 11.3 | 37.9 | 142 | 12.7 | 44.2 | 186 | 14.2 | 50.8 | 237 | 15.7 | 57.7 | 294 | 17.1 | 65.0 | 359 | 18.6 | 72.7 | 432 | 20.1 | 80.8 | 513 |
| Huila | Jamba | Tchamuteta (ex ( | 2.82 | 2.2 | 6.1 | 6 | 2.5 | 7.2 | 13 | 2.9 | 8.8 | 22 | 3.5 | 10.9 | 33 | 4.3 | 13.6 | 47 | 5.1 | 16.8 | 63 | 6.0 | 20.3 | 84 | 6.7 | 23.2 | 107 | 7.4 | 26.3 | 133 | 8.0 | 29.6 | 163 | 8.7 | 33.0 | 196 | 9.4 | 36.6 | 232 | 10.0 | 40.4 | 273 |
| Huila | Jamba | Chilumbo | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.3 | 1 | 0.1 | 0.5 | 1 | 0.2 | 0.5 | 2 | 0.2 | 0.6 | 2 | 0.2 | 0.8 | 3 | 0.2 | 0.9 | 4 | 0.3 | 1.0 | 5 | 0.3 | 1.1 | 6 |
| Huila | Jamba | Dumbo | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 1 | 0.1 | 0.3 | 1 | 0.1 | 0.3 | 1 | 0.1 | 0.4 | 2 | 0.1 | 0.5 | 2 | 0.1 | 0.5 | 3 | 0.2 | 0.6 | 3 | 0.2 | 0.7 | 4 |
| Huila | Jamba | Aindongo-Canga | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.2 | 1 | 0.1 | 0.4 | 1 | 0.1 | 0.5 | 1 | 0.2 | 0.6 | 2 | 0.2 | 0.7 | 3 | 0.2 | 0.8 | 3 | 0.2 | 0.9 | 4 | 0.3 | 1.0 | 5 | 0.3 | 1.2 | 7 |
| Huila | Chipindo | Bambi | 2.82 | 0.8 | 2.3 | 2 | 0.8 | 2.5 | 5 | 0.9 | 2.7 | 7 | 1.0 | 3.0 | 10 | 1.1 | 3.5 | 14 | 1.2 | 3.9 | 18 | 1.3 | 4.5 | 22 | 1.4 | 4.9 | 27 | 1.5 | 5.4 | 33 | 1.6 | 5.9 | 38 | 1.7 | 6.4 | 45 | 1.8 | 6.9 | 52 | 1.9 | 7.5 | 59 |
| Huila | Gambos | Tchibemba | 2.82 | 23.0 | 65.0 | 65 | 23.4 | 68.0 | 133 | 23.9 | 71.7 | 205 | 24.6 | 76.0 | 281 | 25.5 | 81.0 | 362 | 26.5 | 86.8 | 449 | 27.5 | 92.8 | 541 | 28.3 | 98.3 | 640 | 29.1 | 104.0 | 744 | 29.8 | 110.0 | 854 | 30.6 | 116.2 | 970 | 31.4 | 122.7 | 1,093 | 32.2 | 129.6 | 1,222 |
| Huila | Gambos | Nihikilo | 2.82 | 0.3 | 0.7 | 1 | 0.3 | 0.8 | 1 | 0.3 | 0.8 | 2 | 0.3 | 0.9 | 3 | 0.3 | 1.0 | 4 | 0.3 | 1.1 | 5 | 0.4 | 1.2 | 6 | 0.4 | 1.3 | 8 | 0.4 | 1.4 | 9 | 0.4 | 1.5 | 11 | 0.4 | 1.6 | 12 | 0.4 | 1.7 | 14 | 0.5 | 1.8 | 16 |
| Huila | Gambos | Viriambundo | 2.82 | 1.5 | 4.2 | 4 | 1.6 | 4.7 | 9 | 1.8 | 5.5 | 14 | 2.1 | 6.4 | 21 | 2.4 | 7.6 | 28 | 2.7 | 9.0 | 37 | 3.1 | 10.4 | 48 | 3.4 | 11.7 | 59 | 3.6 | 13.0 | 72 | 3.9 | 14.4 | 87 | 4.2 | 15.9 | 103 | 4.5 | 17.5 | 120 | 4.7 | 19.1 | 139 |
| Huila | Humpata | Palanca | 2.82 | 1.5 | 4.2 | 4 | 1.6 | 4.8 | 9 | 1.9 | 5.6 | 15 | 2.2 | 6.7 | 21 | 2.5 | 8.1 | 29 | 3.0 | 9.8 | 39 | 3.4 | 11.5 | 51 | 3.8 | 13.1 | 64 | 4.1 | 14.7 | 78 | 4.4 | 16.3 | 95 | 4.8 | 18.1 | 113 | 5.1 | 20.0 | 133 | 5.5 | 21.9 | 155 |
| Huila | Humpata | Batabata | 2.82 | 3.8 | 10.6 | 11 | 3.9 | 11.2 | 22 | 4.0 | 12.0 | 34 | 4.2 | 12.9 | 47 | 4.4 | 14.0 | 61 | 4.7 | 15.3 | 76 | 5.0 | 16.7 | 93 | 5.2 | 17.9 | 111 | 5.4 | 19.2 | 130 | 5.6 | 20.6 | 151 | 5.8 | 22.0 | 172 | 6.0 | 23.5 | 196 | 6.2 | 25.0 | 221 |
| Huila | Humpata | Kaholo | 2.82 | 1.1 | 3.2 | 3 | 1.7 | 4.9 | 8 | 2.5 | 7.5 | 16 | 3.5 | 10.8 | 26 | 4.8 | 15.2 | 42 | 6.3 | 20.5 | 62 | 7.8 | 26.1 | 88 | 8.9 | 30.9 | 119 | 10.0 | 35.9 | 155 | 11.2 | 41.2 | 196 | 12.3 | 46.8 | 243 | 13.5 | 52.7 | 296 | 14.6 | 58.9 | 355 |
| Huila | Humpata | Neves | 2.82 | 0.0 | 0.0 | 0 | 0.2 | 

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2015 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2016 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2017 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2018 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2019 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2020 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2021 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2022 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2023 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2024 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2025 (x1000) | CUM. COST (x1000) | TOTAL ACCESS (x1000) | COST 2026 (x1000) | CUM. COST (x1000) |
| Kuanza Norte | Camabatela (Amba | Bindo | 2.99 | 0.2 | 0.7 | 1 | 0.4 | 1.2 | 2 | 0.6 | 1.9 | 4 | 0.9 | 2.9 | 7 | 1.3 | 4.2 | 11 | 1.7 | 5.8 | 17 | 2.1 | 7.5 | 24 | 2.4 | 8.9 | 33 | 2.8 | 10.4 | 44 | 3.1 | 12.0 | 56 | 3.4 | 13.7 | 69 | 3.7 | 15.4 | 85 | 4.1 | 17.3 | 102 |
| Kuanza Norte | Bolongongo | Terreiro | 2.99 | 0.3 | 0.8 | 1 | 0.3 | 0.9 | 2 | 0.3 | 1.1 | 3 | 0.4 | 1.2 | 4 | 0.4 | 1.5 | 6 | 0.5 | 1.8 | 7 | 0.6 | 2.1 | 9 | 0.6 | 2.3 | 12 | 0.7 | 2.6 | 14 | 0.7 | 2.9 | 17 | 0.8 | 3.2 | 20 | 0.8 | 3.5 | 24 | 0.9 | 3.8 | 28 |
| Kuanza Norte | Bolongongo | Quiquiemba | 2.99 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.4 | 1 | 0.2 | 0.7 | 1 | 0.3 | 1.0 | 2 | 0.4 | 1.3 | 4 | 0.4 | 1.5 | 5 | 0.5 | 1.8 | 7 | 0.5 | 2.1 | 9 | 0.6 | 2.4 | 11 | 0.7 | 2.7 | 14 | 0.7 | 3.1 | 17 |
| Kuanza Norte | Banga | Aldeia Nova | 2.99 | 0.9 | 2.7 | 3 | 1.0 | 3.0 | 6 | 1.1 | 3.4 | 9 | 1.2 | 3.9 | 13 | 1.3 | 4.5 | 18 | 1.5 | 5.3 | 23 | 1.7 | 6.0 | 29 | 1.8 | 6.7 | 36 | 2.0 | 7.4 | 43 | 2.1 | 8.2 | 51 | 2.2 | 9.0 | 60 | 2.4 | 9.8 | 70 | 2.5 | 10.6 | 81 |
| Kuanza Norte | Banga | Caculo Cabaça | 2.99 | 0.1 | 0.4 | 0 | 0.2 | 0.5 | 1 | 0.2 | 0.6 | 1 | 0.2 | 0.8 | 2 | 0.3 | 1.0 | 3 | 0.4 | 1.3 | 5 | 0.4 | 1.6 | 6 | 0.5 | 1.8 | 8 | 0.5 | 2.1 | 10 | 0.6 | 2.3 | 12 | 0.7 | 2.6 | 15 | 0.7 | 2.9 | 18 | 0.8 | 3.2 | 21 |
| Kuanza Norte | Samba Cajú | Samba Lucala | 2.99 | 0.8 | 2.3 | 2 | 1.1 | 3.5 | 6 | 1.7 | 5.3 | 11 | 2.3 | 7.6 | 19 | 3.2 | 10.6 | 29 | 4.1 | 14.3 | 44 | 5.1 | 18.2 | 62 | 5.9 | 21.5 | 83 | 6.6 | 25.0 | 108 | 7.4 | 28.7 | 137 | 8.1 | 32.6 | 170 | 8.9 | 36.7 | 206 | 9.6 | 41.0 | 247 |
| Kuanza Norte | Ngonguembo | Camame | 2.99 | 0.3 | 0.9 | 1 | 0.4 | 1.1 | 2 | 0.4 | 1.4 | 3 | 0.6 | 1.8 | 5 | 0.7 | 2.3 | 8 | 0.8 | 2.9 | 10 | 1.0 | 3.5 | 14 | 1.1 | 4.0 | 18 | 1.2 | 4.6 | 23 | 1.3 | 5.2 | 28 | 1.5 | 5.8 | 34 | 1.6 | 6.5 | 40 | 1.7 | 7.2 | 47 |
| Kuanza Norte | Ngonguembo | Cavunga | 2.99 | 0.1 | 0.2 | 0 | 0.1 | 0.3 | 1 | 0.1 | 0.4 | 1 | 0.1 | 0.4 | 1 | 0.2 | 0.6 | 2 | 0.2 | 0.7 | 3 | 0.2 | 0.9 | 3 | 0.3 | 1.0 | 4 | 0.3 | 1.1 | 6 | 0.3 | 1.3 | 7 | 0.4 | 1.4 | 8 | 0.4 | 1.6 | 10 | 0.4 | 1.8 | 12 |
| Kuanza Sul | Sumbe | Gungo | 2.96 | 10.2 | 30.3 | 30 | 10.5 | 32.2 | 62 | 11.0 | 34.6 | 97 | 11.6 | 37.5 | 135 | 12.3 | 41.1 | 176 | 13.2 | 45.3 | 221 | 14.0 | 49.6 | 271 | 14.7 | 53.5 | 324 | 15.3 | 57.6 | 382 | 16.0 | 61.9 | 444 | 16.7 | 66.4 | 510 | 17.3 | 71.1 | 581 | 18.0 | 76.0 | 657 |
| Kuanza Sul | Sumbe | Nganguila | 2.96 | 3.6 | 10.7 | 11 | 3.8 | 11.5 | 22 | 4.0 | 12.5 | 35 | 4.3 | 13.9 | 49 | 4.6 | 15.5 | 64 | 5.1 | 17.4 | 81 | 5.5 | 19.5 | 101 | 5.8 | 21.3 | 122 | 6.2 | 23.1 | 145 | 6.5 | 25.1 | 170 | 6.8 | 27.2 | 198 | 7.1 | 29.3 | 227 | 7.5 | 31.6 | 258 |
| Kuanza Sul | Sumbe | Kicombo | 2.96 | 0.4 | 1.1 | 1 | 0.7 | 2.0 | 3 | 1.1 | 3.5 | 7 | 1.6 | 5.3 | 12 | 2.3 | 7.8 | 20 | 3.1 | 10.7 | 30 | 3.9 | 13.8 | 44 | 4.5 | 16.5 | 61 | 5.1 | 19.3 | 80 | 5.7 | 22.2 | 102 | 6.4 | 25.3 | 128 | 7.0 | 28.6 | 156 | 7.6 | 32.1 | 188 |
| Kuanza Sul | Ambiom | Assango | 2.96 | 2.2 | 6.4 | 6 | 3.1 | 9.6 | 16 | 4.6 | 14.5 | 30 | 6.5 | 20.9 | 51 | 8.8 | 29.4 | 81 | 11.5 | 39.6 | 120 | 14.2 | 50.3 | 171 | 16.3 | 59.5 | 230 | 18.4 | 69.1 | 299 | 20.5 | 79.3 | 378 | 22.6 | 90.0 | 468 | 24.7 | 101.3 | 570 | 26.8 | 113.2 | 683 |
| Kuanza Sul | Quilenda | Kirimbo | 2.96 | 0.0 | 0.0 | 0 | 0.3 | 1.0 | 1 | 0.8 | 2.6 | 4 | 1.4 | 4.6 | 8 | 2.2 | 7.3 | 15 | 3.1 | 10.6 | 26 | 4.0 | 14.1 | 40 | 4.7 | 17.1 | 57 | 5.4 | 20.2 | 77 | 6.1 | 23.4 | 101 | 6.8 | 26.9 | 128 | 7.4 | 30.5 | 158 | 8.1 | 34.4 | 193 |
| Kuanza Sul | Porto Amboim | Kapolo | 2.96 | 9.0 | 26.7 | 27 | 9.2 | 28.1 | 55 | 9.5 | 29.9 | 85 | 9.9 | 32.0 | 117 | 10.4 | 34.6 | 151 | 10.9 | 37.5 | 189 | 11.5 | 40.6 | 229 | 11.9 | 43.4 | 273 | 12.3 | 46.3 | 319 | 12.8 | 49.3 | 368 | 13.2 | 52.5 | 421 | 13.6 | 55.9 | 477 | 14.0 | 59.4 | 536 |
| Kuanza Sul | Libolo | Munenga | 2.96 | 1.0 | 3.0 | 3 | 1.2 | 3.8 | 7 | 1.6 | 5.0 | 12 | 2.0 | 6.5 | 18 | 2.6 | 8.6 | 27 | 3.2 | 11.0 | 38 | 3.9 | 13.6 | 51 | 4.3 | 15.8 | 67 | 4.8 | 18.2 | 86 | 5.3 | 20.6 | 106 | 5.8 | 23.2 | 129 | 6.3 | 26.0 | 155 | 6.8 | 28.8 | 184 |
| Kuanza Sul | Libolo | Kabuta | 2.96 | 2.0 | 5.9 | 6 | 2.5 | 7.5 | 13 | 3.2 | 10.0 | 23 | 4.1 | 13.2 | 37 | 5.2 | 17.3 | 54 | 6.5 | 22.3 | 76 | 7.8 | 27.5 | 104 | 8.8 | 32.0 | 136 | 9.8 | 36.7 | 172 | 10.8 | 41.7 | 214 | 11.8 | 46.9 | 261 | 12.8 | 52.5 | 313 | 13.8 | 58.3 | 372 |
| Kuanza Sul | Libolo | Kissongo | 2.96 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 1.0 | 1 | 0.5 | 1.7 | 3 | 0.8 | 2.7 | 6 | 1.2 | 4.0 | 10 | 1.5 | 5.3 | 15 | 1.7 | 6.4 | 21 | 2.0 | 7.5 | 29 | 2.3 | 8.7 | 38 | 2.5 | 10.0 | 48 | 2.8 | 11.4 | 59 | 3.0 | 12.8 | 72 |
| Kuanza Sul | Quibala | Ndala Kachimbo | 2.96 | 0.0 | 0.0 | 0 | 0.3 | 1.1 | 1 | 0.9 | 2.7 | 4 | 1.5 | 4.9 | 9 | 2.4 | 7.9 | 17 | 3.3 | 11.4 | 28 | 4.3 | 15.1 | 43 | 5.0 | 18.3 | 61 | 5.8 | 21.6 | 83 | 6.5 | 25.1 | 108 | 7.2 | 28.8 | 137 | 8.0 | 32.7 | 170 | 8.7 | 36.9 | 207 |
| Kuanza Sul | Quibala | Kariango | 2.96 | 0.0 | 0.0 | 0 | 0.5 | 1.4 | 1 | 1.1 | 3.6 | 5 | 2.0 | 6.5 | 11 | 3.1 | 10.3 | 22 | 4.3 | 14.9 | 37 | 5.6 | 19.8 | 56 | 6.5 | 23.9 | 80 | 7.5 | 28.2 | 108 | 8.5 | 32.8 | 141 | 9.5 | 37.7 | 179 | 10.4 | 42.8 | 222 | 11.4 | 48.1 | 270 |
| Kuanza Sul | Quibala | Lonhe | 2.96 | 0.0 | 0.0 | 0 | 0.3 | 1.0 | 1 | 0.8 | 2.5 | 4 | 1.4 | 4.6 | 8 | 2.2 | 7.3 | 15 | 3.1 | 10.5 | 26 | 4.0 | 14.0 | 40 | 4.6 | 16.9 | 57 | 5.3 | 20.0 | 77 | 6.0 | 23.2 | 100 | 6.7 | 26.7 | 127 | 7.4 | 30.3 | 157 | 8.1 | 34.1 | 191 |
| Kuanza Sul | Mussende | Kienha | 2.96 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.2 | 0.6 | 1 | 0.3 | 1.0 | 2 | 0.5 | 1.6 | 3 | 0.7 | 2.3 | 6 | 0.9 | 3.0 | 9 | 1.0 | 3.7 | 12 | 1.2 | 4.3 | 17 | 1.3 | 5.0 | 22 | 1.5 | 5.8 | 28 | 1.6 | 6.6 | 34 | 1.8 | 7.4 | 41 |
| Kuanza Sul | Mussende | S. Lucas | 2.96 | 0.0 | 0.0 | 0 | 0.4 | 1.1 | 1 | 0.9 | 2.9 | 4 | 1.6 | 5.2 | 9 | 2.5 | 8.3 | 17 | 3.5 | 12.0 | 29 | 4.5 | 15.9 | 45 | 5.3 | 19.2 | 64 | 6.0 | 22.7 | 87 | 6.8 | 26.4 | 114 | 7.6 | 30.3 | 144 | 8.4 | 34.4 | 178 | 9.2 | 38.7 | 217 |
| Kuanza Sul | Seles | Amboiva | 2.96 | 1.8 | 5.2 | 5 | 2.7 | 8.1 | 13 | 4.0 | 12.6 | 26 | 5.7 | 18.4 | 44 | 7.8 | 26.1 | 70 | 10.3 | 35.4 | 106 | 12.8 | 45.2 | 151 | 14.7 | 53.6 | 205 | 16.6 | 62.3 | 267 | 18.5 | 71.6 | 339 | 20.4 | 81.4 | 420 | 22.3 | 91.7 | 512 | 24.3 | 102.5 | 614 |
| Kuanza Sul | Seles | Botera | 2.96 | 0.8 | 2.3 | 2 | 1.1 | 3.5 | 6 | 1.6 | 5.2 | 11 | 2.3 | 7.4 | 18 | 3.1 | 10.3 | 29 | 4.0 | 13.9 | 43 | 5.0 | 17.6 | 60 | 5.7 | 20.8 | 81 | 6.4 | 24.2 | 105 | 7.2 | 27.7 | 133 | 7.9 | 31.4 | 164 | 8.6 | 35.4 | 200 | 9.3 | 39.5 | 239 |
| Kuanza Sul | Conda | Cunjo | 2.96 | 0.0 | 0.0 | 0 | 0.8 | 2.5 | 2 | 2.0 | 6.4 | 9 | 3.6 | 11.6 | 20 | 5.5 | 18.4 | 39 | 7.7 | 26.6 | 65 | 10.0 | 35.4 | 101 | 11.7 | 42.7 | 144 | 13.5 | 50.5 | 194 | 15.2 | 58.7 | 253 | 16.9 | 67.4 | 320 | 18.7 | 76.5 | 397 | 20.4 | 86.2 | 483 |
| Kuanza Sul | Cassongue | Dumbi | 2.96 | 0.0 | 0.0 | 0 | 1.4 | 4.2 | 4 | 3.4 | 10.8 | 15 | 6.0 | 19.4 | 34 | 9.2 | 30.8 | 65 | 13.0 | 44.7 | 110 | 16.8 | 59.4 | 169 | 19.7 | 71.8 | 241 | 22.6 | 84.8 | 326 | 25.5 | 98.6 | 424 | 28.4 | 113.2 | 538 | 31.3 | 128.5 | 666 | 34.2 | 144.7 | 811 |
| Kuanza Sul | Cassongue | Pambangala | 2.96 | 0.0 | 0.0 | 0 | 1.2 | 3.7 | 4 | 3.0 | 9.5 | 13 | 5.3 | 17.1 | 30 | 8.1 | 27.1 | 57 | 11.4 | 39.3 | 97 | 14.7 | 52.2 | 149 | 17.3 | 63.1 | 212 | 19.9 | 74.6 | 286 | 22.4 | 86.7 | 373 | 25.0 | 99.5 | 473 | 27.5 | 113.0 | 586 | 30.1 | 127.2 | 713 |
| Kuanza Sul | Cassongue | Atomé | 2.96 | 0.0 | 0.0 | 0 | 0.5 | 1.5 | 1 | 1.2 | 3.8 | 5 | 2.1 | 6.8 | 12 | 3.2 | 10.8 | 23 | 4.6 | 15.7 | 39 | 5.9 | 20.8 | 59 | 6.9 | 25.2 | 85 | 7.9 | 29.8 | 114 | 8.9 | 34.6 | 149 | 10.0 | 39.7 | 189 | 11.0 | 45.1 | 234 | 12.0 | 50.8 | 284 |
| Kuanza Sul | Cela(Waku - Kung | Sanga | 2.96 | 0.0 | 0.0 | 0 | 0.5 | 1.4 | 1 | 1.2 | 3.7 | 5 | 2.1 | 6.7 | 12 | 3.2 | 10.6 | 22 | 4.5 | 15.4 | 38 | 5.8 | 20.4 | 58 | 6.8 | 24.7 | 83 | 7.8 | 29.2 | 112 | 8.8 | 33.9 | 146 | 9.8 | 38.9 | 185 | 10.8 | 44.2 | 229 | 11.8 | 49.7 | 279 |
| Kuanza Sul | Ebo | Conde | 2.96 | 0.0 | 0.0 | 0 | 1.3 | 4.0 | 4 | 3.3 | 10.4 | 14 | 5.8 | 18.7 | 33 | 8.9 | 29.7 | 63 | 12.5 | 43.1 | 106 | 16.2 | 57.2 | 163 | 19.0 | 69.2 | 232 | 21.8 | 81.8 | 314 | 24.6 | 95.1 | 409 | 27.4 | 109.1 | 518 | 30.2 | 123.9 | 642 | 33.0 | 139.5 | 782 |
| Kuanza Sul | Ebo | Kissange | 2.96 | 0.0 | 0.0 | 0 | 0.8 | 2.3 | 2 | 1.9 | 5.9 | 8 | 3.3 | 10.7 | 19 | 5.1 | 17.0 | 36 | 7.2 | 24.6 | 61 | 9.2 | 32.7 | 93 | 10.8 | 39.5 | 133 | 12.4 | 46.7 | 179 | 14.0 | 54.3 | 234 | 15.6 | 62.3 | 296 | 17.3 | 70.8 | 367 | 18.9 | 79.7 | 447 |
| Luanda | Kilamba Kiaxi | Havemos de Voll | 2.82 | 0.0 | 0.0 | 0 | 3.3 | 9.7 | 10 | 8.3 | 24.9 | 35 | 14.6 | 44.9 | 80 | 22.5 | 71.4 | 151 | 31.6 | 103.5 | 254 | 40.8 | 137.4 | 392 | 47.9 | 166.1 | 558 | 54.9 | 196.4 | 754 | 62.0 | 228.3 | 983 | 69.1 | 262.0 | 1,245 | 76.1 | 297.5 | 1,542 | 83.2 | 334.9 | 1,877 |
| Luanda | Samba | Benfica | 2.82 | 6.1 | 17.1 | 17 | 8.0 | 23.3 | 40 | 11.0 | 32.9 | 73 | 14.7 | 45.2 | 119 | 19.3 | 61.4 | 180 | 24.8 | 81.0 | 261 | 30.2 | 101.7 | 363 | 34.3 | 119.2 | 482 | 38.5 | 137.7 | 620 | 42.7 | 157.3 | 777 | 46.9 | 177.9 | 955 | 51.1 | 199.5 | 1,154 | 55.3 | 222.3 | 1,377 |
| Luanda | Samba | Mussulo | 2.82 | 0.0 | 0.0 | 0 | 0.3 | 0.7 | 1 | 0.6 | 1.9 | 3 | 1.1 | 3.4 | 6 | 1.7 | 5.4 | 11 | 2.4 | 7.9 | 19 | 3.1 | 10.5 | 30 | 3.6 | 12.7 | 43 | 4.2 | 15.0 | 57 | 4.7 | 17.4 | 75 | 5.3 | 20.0 | 95 | 5.8 | 22.7 | 118 | 6.3 | 25.5 | 143 |
| Luanda | Cacuaco | Quicolo | 2.82 | 2.1 | 5.9 | 6 | 3.9 | 11.4 | 17 | 6.7 | 19.9 | 37 | 10.1 | 31.1 | 68 | 14.4 | 45.8 | 114 | 19.4 | 63.6 | 178 | 24.5 | 82.4 | 260 | 28.3 | 98.4 | 358 | 32.2 | 115.2 | 474 | 36.1 | 133.0 | 607 | 40.0 | 151.7 | 758 | 43.9 | 171.4 | 930 | 47.8 | 192.1 | 1,122 |
| Luanda | Rangel | Marçal | 2.82 | 0.0 | 0.0 | 0 | 3.7 | 10.9 | 11 | 9.4 | 28.0 | 39 | 16.4 | 50.5 | 89 | 25.3 | 80.3 | 170 | 35.6 | 116.4 | 286 | 45.9 | 154.6 | 441 | 53.8 | 186.9 | 628 | 61.8 | 220.9 | 849 | 69.7 | 256.8 | 1,105 | 77.7 | 294.7 | 1,400 | 85.7 | 334.7 | 1,735 | 93.6 | 376.7 | 2,111 |
| Luanda | Sambizanga | Operário | 2.82 | 0.0 | 0.0 | 0 | 3.7 | 10.9 | 11 | 9.4 | 28.0 | 39 | 16.4 | 50.5 | 89 | 25.3 | 80.3 | 170 | 35.6 | 116.4 | 286 | 45.9 | 154.6 | 441 | 53.8 | 186.9 | 628 | 61.8 | 220.9 | 849 | 69.7 | 256.8 | 1,105 | 77.7 | 294.7 | 1,400 | 85.7 | 334.7 | 1,735 | 93.6 | 376.7 | 2,111 |
| Lunda Norte | Chitato | Lóvua | 2.93 | 0.0 | 0.0 | 0 | 0.3 | 0.8 | 1 | 0.7 | 2.1 | 3 | 1.2 | 3.8 | 7 | 1.8 | 6.1 | 13 | 2.6 | 8.8 | 22 | 3.3 | 11.7 | 33 | 3.9 | 14.2 | 48 | 4.5 | 16.7 | 64 | 5.1 | 19.5 | 84 | 5.7 | 22.3 | 106 | 6.2 | 25.3 | 131 | 6.8 | 28.5 | 160 |
| Lunda Norte | Lucapa | Camissombo | 2.93 | 6.0 | 17.6 | 18 | 6.3 | 19.0 | 37 | 6.7 | 20.9 | 57 | 7.3 | 23.3 | 81 | 8.0 | 26.2 | 107 | 8.8 | 29.7 | 137 | 9.6 | 33.4 | 170 | 10.2 | 36.6 | 207 | 10.8 | 40.0 | 247 | 11.4 | 43.6 | 290 | 12.0 | 47.3 | 338 | 12.6 | 51.2 | 389 | 13.2 | 55.3 | 444 |
| Lunda Norte | Lucapa | Capaia | 2.93 | 2.9 | 8.6 | 9 | 3.1 | 9.4 | 18 | 3.4 | 10.4 | 28 | 3.7 | 11.8 | 40 | 4.1 | 13.5 | 54 | 4.5 | 15.5 | 69 | 5.0 | 17.6 | 87 | 5.4 | 19.4 | 106 | 5.7 | 21.3 | 127 | 6.1 | 23.3 | 151 | 6.5 | 25.5 | 176 | 6.8 | 27.7 | 204 | 7.2 | 30.0 | 234 |
| Lunda Norte | Lucapa | Xa-cassau | 2.93 | 0.2 | 0.6 | 1 | 0.6 | 1.7 | 2 | 1.1 | 3.5 | 6 | 1.8 | 5.8 | 12 | 2.7 | 8.8 | 20 | 3.7 | 12.5 | 33 | 4.7 | 16.5 | 49 | 5.5 | 19.8 | 69 | 6.3 | 23.3 | 92 | 7.0 | 26.9 | 119 | 7.8 | 30.8 | 150 | 8.6 | 34.9 | 185 | 9.4 | 39.2 | 224 |
| Lunda Norte | Cambulo | Canzar | 2.93 | 7.4 | 21.7 | 22 | 7.5 | 22.7 | 44 | 7.7 | 23.9 | 68 | 7.9 | 25.2 | 93 | 8.1 | 26.9 | 120 | 8.5 | 28.7 | 149 | 8.8 | 30.6 | 180 | 9.0 | 32.4 | 212 | 9.2 | 34.3 | 246 | 9.5 | 36.2 | 283 | 9.7 | 38.2 | 321 | 9.9 | 40.3 | 361 | 10.2 | 42.5 | 404 |
| Lunda Norte | Cambulo | Cachimo | 2.93 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.4 | 1 | 0.2 | 0.7 | 1 | 0.3 | 1.0 | 3 | 0.4 | 1.4 | 4 | 0.5 | 1.6 | 6 | 0.5 | 1.9 | 7 | 0.6 | 2.3 | 10 | 0.7 | 2.6 | 12 | 0.7 | 2.9 | 15 | 0.8 | 3.3 | 19 |
| Lunda Norte | Cambulo | Luia | 2.93 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.2 | 0.6 | 1 | 0.4 | 1.2 | 2 | 0.6 | 1.8 | 4 | 0.8 | 2.7 | 7 | 1.0 | 3.5 | 10 | 1.2 | 4.3 | 14 | 1.4 | 5.0 | 19 | 1.5 | 5.9 | 25 | 1.7 | 6.7 | 32 | 1.9 | 7.6 | 40 | 2.1 | 8.6 | 48 |
| Lunda Norte | Cuilo | Caluango | 2.93 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 1.8 | 3 | 1.0 | 3.3 | 6 | 1.6 | 5.2 | 11 | 2.2 | 7.5 | 19 | 2.9 | 10.0 | 29 | 3.4 | 12.1 | 41 | 3.9 | 14.3 | 55 | 4.3 | 16.6 | 72 | 4.8 | 19.1 | 91 | 5.3 | 21.7 | 112 | 5.8 | 24.4 | 137 |
| Lunda Norte | Caungula | Camaxilo | 2.93 | 0.0 | 0.0 | 0 | 0.3 | 1.0 | 1 | 0.8 | 2.5 | 3 | 1.4 | 4.5 | 8 | 2.2 | 7.2 | 15 | 3.1 | 10.4 | 26 | 3.9 | 13.8 | 39 | 4.6 | 16.7 | 56 | 5.3 | 19.7 | 76 | 6.0 | 22.9 | 99 | 6.7 | 26.3 | 125 | 7.4 | 29.9 | 155 | 8.0 | 33.6 | 188 |
| Lunda Norte | Cuango | Cuango | 2.93 | 7.6 | 22.4 | 22 | 11.3 | 34.0 | 56 | 16.7 | 52.0 | 108 | 23.6 | 75.4 | 184 | 32.2 | 106.2 | 290 | 42.2 | 143.4 | 433 | 52.2 | 182.7 | 616 | 59.9 | 216.0 | 832 | 67.7 | 251.2 | 1,083 | 75.4 | 288.3 | 1,372 | 83.2 | 327.4 | 1,699 | 90.9 | 368.6 | 2,068 | 98.6 | 412.0 | 2,480 |
| Lunda Norte | Cuango | Luremo | 2.93 | 0.0 | 0.0 | 0 | 0.6 | 1.9 | 2 | 1.6 | 4.9 | 7 | 2.8 | 8.8 | 16 | 4.3 | 14.0 | 30 | 6.0 | 20.3 | 50 | 7.7 | 27.0 | 77 | 9.1 | 32.6 | 110 | 10.4 | 38.6 | 148 | 11.7 | 44.8 | 193 | 13.1 | 51.4 | 244 | 14.4 | 58.4 | 303 | 15.7 | 65.8 | 369 |
| Lunda Norte | Lubalo | Muvulage | 2.93 | 0.0 | 0.0 | 0 | 0.2 | 0.6 | 1 | 0.5 | 1.6 | 2 | 0.9 | 2.9 | 5 | 1.4 | 4.7 | 10 | 2.0 | 6.7 | 17 | 2.6 | 9.0 | 26 | 3.0 | 10.8 | 36 | 3.4 | 12.8 | 49 | 3.9 | 14.9 | 64 | 4.3 | 17.1 | 81 | 4.8 | 19.4 | 101 | 5.2 | 21.8 | 122 |
| Lunda Norte | Lubalo | Luangue | 2.93 | 0.0 | 0.0 | 0 | 0.2 | 0.6 | 1 | 0.5 | 1.6 | 2 | 0.9 | 2.9 | 5 | 1.4 | 4.6 | 10 | 2.0 | 6.7 | 17 | 2.6 | 8.9 | 25 | 3.0 | 10.8 | 36 | 3.4 | 12.8 | 49 | 3.9 | 14.8 | 64 | 4.3 | 17.0 | 81 | 4.8 | 19.3 | 100 | 5.2 | 21.8 | 122 |
| Lunda Norte | Capenda-Camulen | Xinge | 2.93 | 0.3 | 0.9 | 1 | 0.9 | 2.8 | 4 | 1.9 | 5.8 | 9 | 3.0 | 9.7 | 19 | 4.5 | 14.9 | 34 | 6.2 | 21.2 | 55 | 7.9 | 27.8 | 83 | 9.3 | 33.4 | 116 | 10.6 | 39.3 | 156 | 11.9 | 45.6 | 201 | 13.3 | 52.2 | 254 | 14.6 | 59.1 | 313 | 15.9 | 66.4 | 379 |
| Lunda Norte | Xá-muteba | Longo | 2.93 | 0.0 | 0.0 | 0 | 0.6 | 1.7 | 2 | 1.4 | 4.4 | 6 | 2.5 | 7.9 | 14 | 3.8 | 12.6 | 27 | 5.4 | 18.3 | 45 | 6.9 | 24.2 | 69 | 8.1 | 29.3 | 98 | 9.3 | 34.6 | 133 | 10.5 | 40.3 | 173 | 11.7 | 46.2 | 220 | 12.9 | 52.5 | 272 | 14.1 | 59.1 | 331 |
| Lunda Norte | Xá-muteba | Cassage-Caluca | 2.93 | 0.0 | 0.0 | 0 | 0.6 | 1.8 | 2 | 1.5 | 4.7 | 7 | 2.7 | 8.5 | 15 | 4.1 | 13.5 | 29 | 5.8 | 19.6 | 48 | 7.4 | 26.0 | 74 | 8.7 | 31.4 | 106 | 10.0 | 37.2 | 143 | 11.3 | 43.2 | 186 | 12.6 | 49.6 | 236 | 13.9 | 56.3 | 292 | 15.2 | 63.4 | 355 |
| Lunda Sul (2) | Saurimo | Mona Quimbund | 3.16 | 0.2 | 0.6 | 1 | 0.9 | 2.8 | 3 | 2.2 | 7.5 | 11 | 3.8 | 13.2 | 24 | 5.1 | 18.0 | 42 | 5.7 | 20.9 | 63 | 5.9 | 22.4 | 85 | 6.1 | 23.6 | 109 | 6.2 | 24.9 | 134 | 6.4 | 26.2 | 160 | 6.5 | 27.6 | 188 | 6.6 | 29.0 | 217 | 6.8 | 30.5 | 247 |
| Lunda Sul (2) | Saurimo | Sombo | 3.16 | 0.9 | 2.9 | 3 | 1.6 | 5.2 | 8 | 3.0 | 10.1 | 18 | 4.6 | 16.0 | 34 | 5.9 | 21.0 | 55 | 6.6 | 24.1 | 79 | 6.8 | 25.8 | 105 | 7.0 | 27.1 | 132 | 7.1 | 28.5 | 161 | 7.2 | 29.9 | 190 | 7.4 | 31.4 | 222 | 7.5 | 32.9 | 255 | 7.7 | 34.6 | 289 |
| Lunda Sul (2) | Muconda | Cassai | 3.16 | 0.8 | 2.4 | 2 | 1.8 | 5.7 | 8 | 3.9 | 13.0 | 21 | 6.3 | 21.8 | 43 | 8.3 | 29.3 | 72 | 9.3 | 33.9 | 106 | 9.6 | 36.3 | 143 | 9.8 | 38.2 | 181 | 10.0 | 40.2 | 221 | 10.3 | 42.3 | 263 | 10.5 | 44.4 | 308 | 10.7 | 46.7 | 354 | 10.9 | 49.0 | 403 |
| Lunda Sul (2) | Muconda | Chiluange | 3.16 | 0.8 | 2.5 | 2 | 3.1 | 10.0 | 12 | 7.9 | 26.4 | 39 | 13.4 | 46.1 | 85 | 17.7 | 62.9 | 148 | 20.0 | 73.2 | 221 | 20.8 | 78.4 | 299 | 21.3 | 82.6 | 382 | 21.7 | 87.0 | 469 | 22.2 | 91.6 | 561 | 22.7 | 96.3 | 657 | 23.2 | 101.3 | 758 | 23.6 | 106.5 | 865 |
| Lunda Sul (2) | Muconda | Muriege | 3.16 | 0.9 | 2.8 | 3 | 2.8 | 9.1 | 12 | 6.8 | 22.7 | 35 | 11.3 | 39.2 | 74 | 15.0 | 53.2 | 127 | 16.9 | 61.7 | 189 | 17.5 | 66.1 | 255 | 17.9 | 69.6 | 324 | 18.3 | 73.3 | 398 | 18.7 | 77.1 | 475 | 19.1 | 81.1 | 556 | 19.5 | 85.3 | 641 | 19.9 | 89.6 | 731 |
| Lunda Sul (2) | Dala | Cazage | 3.16 | 0.4 | 1.3 | 1 | 2.1 | 6.9 | 8 | 5.7 | 19.2 | 27 | 9.8 | 33.9 | 61 | 13.1 | 46.5 | 108 | 14.8 | 54.2 | 162 | 15.4 | 58.1 | 220 | 15.7 | 61.2 | 281 | 16.1 | 64.5 | 346 | 16.5 | 67.9 | 414 | 16.8 | 71.4 | 485 | 17.2 | 75.1 | 560 | 17.5 | 79.0 | 639 |
| Lunda Sul (2) | Dala | Luma Cassai | 3.16 | 0.1 | 0.3 | 0 | 1.9 | 6.3 | 7 | 5.8 | 19.3 | 26 | 10.1 | 35.0 | 61 | 13.6 | 48.4 | 109 | 15.4 | 56.5 | 166 | 16.1 | 60.6 | 226 | 16.4 | 63.9 | 290 | 16.8 | 67.3 | 358 | 17.2 | 70.9 | 428 | 17.6 | 74.6 | 503 | 18.0 | 78.5 | 582 | 18.3 | 82.6 | 664 |
| Lunda Sul (2) | Cacolo | Alto - Chicapa | 3.16 | 1.2 | 3.8 | 4 | 2.4 | 7.9 | 12 | 5.0 | 16.9 | 29 | 8.0 | 27.7 | 56 | 10.4 | 36.8 | 93 | 11.6 | 42.5 | 136 | 12.0 | 45.4 | 181 | 12.3 | 47.8 | 229 | 12.5 | 50.2 | 279 | 12.8 | 52.8 | 332 | 13.1 | 55.5 | 387 | 13.3 | 58.3 | 445 | 13.6 | 61.2 | 507 |
| Lunda Sul (2) | Cacolo | Cucumbi | 3.16 | 0.1 | 0.3 | 0 | 1.2 | 3.9 | 4 | 3.5 | 11.8 | 16 | 6.2 | 21.3 | 37 | 8.3 | 29.4 | 67 | 9.4 | 34.3 | 101 | 9.8 | 36.8 | 138 | 10.0 | 38.8 | 177 | 10.2 | 40.9 | 217 | 10.4 | 43.0 | 260 | 10.7 | 45.3 | 306 | 10.9 | 47.7 | 353 | 11.1 | 50.1 | 404 |
| Lunda Sul (2) | Cacolo | Xassengue | 3.16 | 0.0 | 0.0 | 0 | 1.0 | 3.1 | 3 | 3.0 | 9.9 | 13 | 5.3 | 18.2 | 31 | 7.1 | 25.2 | 56 | 8.0 | 29.4 | 86 | 8.4 | 31.6 | 117 | 8.6 | 33.3 | 151 | 8.8 | 35.1 | 186 | 9.0 | 37.0 | 223 | 9.2 | 38.9 | 262 | 9.4 | 41.0 | 303 | 9.6 | 43.1 | 346 |
| Malanje | Malanje | Cambaxe | 2.90 | 5.2 | 15.1 | 15 | 5.4 | 16.2 | 31 | 5.8 | 17.8 | 49 | 6.2 | 19.7 | 69 | 6.7 | 22.0 | 91 | 7.4 | 24.7 | 116 | 8.0 | 27.6 | 143 | 8.5 | 30.2 | 173 | 8.9 | 32.9 | 206 | 9.4 | 35.7 | 242 | 9.9 | 38.6 | 281 | 10.4 | 41.7 | 322 | 10.9 | 44.9 | 367 |
| Malanje | Malanje | Ngola - Luige | 2.90 | 1.7 |

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Malanje | Cagandala | Mbembo | 2.90 | 0.0 | 0.0 | 0 | 0.2 | 0.5 | 1 | 0.4 | 1.3 | 2 | 0.7 | 2.4 | 4 | 1.2 | 3.8 | 8 | 1.6 | 5.5 | 13 | 2.1 | 7.3 | 21 | 2.5 | 8.8 | 30 | 2.8 | 10.4 | 40 | 3.2 | 12.1 | 52 | 3.6 | 13.9 | 66 | 3.9 | 15.7 | 82 | 4.3 | 17.7 | 99 |
| Malanje | Cagandala | Kulamagia | 2.90 | 0.0 | 0.0 | 0 | 0.4 | 1.2 | 1 | 1.0 | 3.0 | 4 | 1.7 | 5.4 | 10 | 2.6 | 8.6 | 18 | 3.7 | 12.5 | 31 | 4.8 | 16.6 | 47 | 5.6 | 20.0 | 67 | 6.4 | 23.7 | 91 | 7.3 | 27.5 | 118 | 8.1 | 31.6 | 150 | 8.9 | 35.8 | 186 | 9.8 | 40.3 | 226 |
| Malanje | Kiwaba-Ngozi | Mufuma | 2.90 | 1.4 | 4.0 | 4 | 1.7 | 5.1 | 9 | 2.3 | 6.9 | 16 | 2.9 | 9.3 | 25 | 3.8 | 12.3 | 38 | 4.7 | 15.9 | 54 | 5.7 | 19.8 | 73 | 6.5 | 23.1 | 96 | 7.2 | 26.6 | 123 | 8.0 | 30.2 | 153 | 8.7 | 34.1 | 187 | 9.5 | 38.1 | 225 | 10.2 | 42.4 | 268 |
| Moxico | Moxico | Cagumbe/Kachir | 2.99 | 0.5 | 1.5 | 2 | 0.8 | 2.6 | 4 | 1.3 | 4.3 | 8 | 2.0 | 6.4 | 15 | 2.8 | 9.3 | 24 | 3.7 | 12.7 | 37 | 4.6 | 16.4 | 53 | 5.3 | 19.5 | 73 | 6.0 | 22.7 | 95 | 6.7 | 26.2 | 122 | 7.4 | 29.8 | 151 | 8.1 | 33.6 | 185 | 8.8 | 37.6 | 223 |
| Moxico | Moxico | Lucusse | 2.99 | 9.7 | 29.1 | 29 | 9.8 | 30.3 | 59 | 10.0 | 31.7 | 91 | 10.2 | 33.4 | 124 | 10.5 | 35.3 | 160 | 10.8 | 37.4 | 197 | 11.1 | 39.7 | 237 | 11.4 | 41.8 | 279 | 11.6 | 43.9 | 323 | 11.9 | 46.2 | 369 | 12.1 | 48.5 | 417 | 12.3 | 51.0 | 468 | 12.6 | 53.6 | 522 |
| Moxico | Léua | Liangongo (Sanc | 2.99 | 4.7 | 14.0 | 14 | 4.9 | 15.2 | 29 | 5.3 | 16.8 | 46 | 5.8 | 18.9 | 65 | 6.4 | 21.4 | 86 | 7.0 | 24.4 | 111 | 7.7 | 27.5 | 138 | 8.2 | 30.3 | 169 | 8.8 | 33.2 | 202 | 9.3 | 36.2 | 238 | 9.8 | 39.4 | 277 | 10.3 | 42.8 | 320 | 10.9 | 46.3 | 366 |
| Moxico | Luacano | Lago - Dilolo | 2.99 | 5.8 | 17.3 | 17 | 5.9 | 18.2 | 35 | 6.1 | 19.3 | 55 | 6.3 | 20.7 | 75 | 6.6 | 22.3 | 98 | 7.0 | 24.1 | 122 | 7.3 | 26.1 | 148 | 7.6 | 27.9 | 176 | 7.9 | 29.7 | 205 | 8.1 | 31.6 | 237 | 8.4 | 33.6 | 271 | 8.7 | 35.8 | 307 | 8.9 | 38.0 | 345 |
| Moxico | Lumbala-Nguimbo | Chiume | 2.99 | 0.0 | 0.0 | 0 | 0.1 | 0.4 | 0 | 0.3 | 1.0 | 1 | 0.6 | 1.8 | 3 | 0.9 | 2.9 | 6 | 1.2 | 4.2 | 10 | 1.6 | 5.6 | 16 | 1.8 | 6.8 | 23 | 2.1 | 8.0 | 31 | 2.4 | 9.3 | 40 | 2.7 | 10.7 | 51 | 2.9 | 12.1 | 63 | 3.2 | 13.6 | 76 |
| Moxico | Lumbala-Nguimbo | Lutembo | 2.99 | 0.4 | 1.1 | 1 | 0.5 | 1.4 | 3 | 0.6 | 1.9 | 4 | 0.8 | 2.5 | 7 | 1.0 | 3.2 | 10 | 1.2 | 4.1 | 14 | 1.4 | 5.1 | 19 | 1.6 | 5.9 | 25 | 1.8 | 6.8 | 32 | 2.0 | 7.7 | 40 | 2.2 | 8.7 | 48 | 2.3 | 9.7 | 58 | 2.5 | 10.7 | 69 |
| Moxico | Lumbala-Nguimbo | Mussuma | 2.99 | 0.4 | 1.2 | 1 | 0.5 | 1.5 | 3 | 0.6 | 2.0 | 5 | 0.8 | 2.6 | 7 | 1.0 | 3.4 | 11 | 1.3 | 4.4 | 15 | 1.5 | 5.5 | 21 | 1.7 | 6.4 | 27 | 1.9 | 7.3 | 34 | 2.1 | 8.3 | 43 | 2.3 | 9.3 | 52 | 2.5 | 10.4 | 62 | 2.7 | 11.6 | 74 |
| Moxico | Lumbala-Nguimbo | Ninda | 2.99 | 1.8 | 5.3 | 5 | 1.8 | 5.6 | 11 | 1.9 | 5.9 | 17 | 1.9 | 6.3 | 23 | 2.0 | 6.8 | 30 | 2.1 | 7.4 | 37 | 2.2 | 8.0 | 45 | 2.3 | 8.5 | 54 | 2.4 | 9.0 | 63 | 2.5 | 9.6 | 73 | 2.5 | 10.2 | 83 | 2.6 | 10.8 | 94 | 2.7 | 11.5 | 105 |
| Moxico | Lumbala-Nguimbo | Sessa | 2.99 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.3 | 1 | 0.1 | 0.4 | 1 | 0.1 | 0.5 | 2 | 0.1 | 0.6 | 2 | 0.2 | 0.7 | 3 | 0.2 | 0.7 | 4 | 0.2 | 0.8 | 4 | 0.2 | 1.0 | 5 |
| Moxico | Lumbala-Nguimbo | Luvuei | 2.99 | 0.5 | 1.5 | 2 | 0.5 | 1.7 | 3 | 0.6 | 1.8 | 5 | 0.6 | 2.0 | 7 | 0.7 | 2.3 | 9 | 0.7 | 2.6 | 12 | 0.8 | 2.9 | 15 | 0.9 | 3.2 | 18 | 0.9 | 3.5 | 21 | 1.0 | 3.8 | 25 | 1.0 | 4.1 | 29 | 1.1 | 4.4 | 34 | 1.1 | 4.8 | 39 |
| Moxico | Luchazes | Cangombe | 2.99 | 0.0 | 0.0 | 0 | 0.3 | 0.9 | 1 | 0.8 | 2.4 | 3 | 1.3 | 4.4 | 8 | 2.1 | 7.0 | 15 | 2.9 | 10.1 | 25 | 3.8 | 13.4 | 38 | 4.4 | 16.2 | 54 | 5.1 | 19.1 | 73 | 5.7 | 22.2 | 96 | 6.4 | 25.5 | 121 | 7.0 | 29.0 | 150 | 7.7 | 32.6 | 183 |
| Moxico | Luchazes | Tempue | 2.99 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 1.8 | 2 | 1.0 | 3.2 | 6 | 1.5 | 5.1 | 11 | 2.1 | 7.4 | 18 | 2.8 | 9.9 | 28 | 3.2 | 11.9 | 40 | 3.7 | 14.1 | 54 | 4.2 | 16.4 | 71 | 4.7 | 18.8 | 89 | 5.2 | 21.4 | 111 | 5.7 | 24.1 | 135 |
| Moxico | Luchazes | Cassamba | 2.99 | 1.6 | 4.7 | 5 | 1.7 | 5.1 | 10 | 1.8 | 5.7 | 16 | 2.0 | 6.4 | 22 | 2.1 | 7.2 | 29 | 2.4 | 8.2 | 37 | 2.6 | 9.3 | 47 | 2.8 | 10.2 | 57 | 3.0 | 11.2 | 68 | 3.1 | 12.2 | 80 | 3.3 | 13.3 | 94 | 3.5 | 14.4 | 108 | 3.7 | 15.6 | 124 |
| Moxico | Luchazes | Muie | 2.99 | 0.0 | 0.0 | 0 | 0.1 | 0.3 | 0 | 0.2 | 0.7 | 1 | 0.4 | 1.2 | 2 | 0.6 | 1.9 | 4 | 0.8 | 2.8 | 7 | 1.0 | 3.7 | 11 | 1.2 | 4.5 | 15 | 1.4 | 5.3 | 20 | 1.6 | 6.2 | 27 | 1.8 | 7.1 | 34 | 2.0 | 8.1 | 42 | 2.1 | 9.1 | 51 |
| Moxico | Alto Zambeze | Caianda | 2.99 | 0.0 | 0.0 | 0 | 0.2 | 0.5 | 0 | 0.4 | 1.2 | 2 | 0.7 | 2.2 | 4 | 1.0 | 3.5 | 7 | 1.4 | 5.0 | 12 | 1.9 | 6.6 | 19 | 2.2 | 8.0 | 27 | 2.5 | 9.5 | 36 | 2.8 | 11.0 | 48 | 3.2 | 12.7 | 60 | 3.5 | 14.4 | 75 | 3.8 | 16.2 | 91 |
| Moxico | Alto Zambeze | Calunda | 2.99 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.1 | 0.4 | 1 | 0.2 | 0.8 | 1 | 0.4 | 1.3 | 3 | 0.5 | 1.8 | 5 | 0.7 | 2.4 | 7 | 0.8 | 2.9 | 10 | 0.9 | 3.5 | 13 | 1.0 | 4.0 | 17 | 1.2 | 4.6 | 22 | 1.3 | 5.3 | 27 | 1.4 | 5.9 | 33 |
| Moxico | Alto Zambeze | Lóvua | 2.99 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.4 | 0 | 0.2 | 0.6 | 1 | 0.3 | 1.0 | 2 | 0.4 | 1.5 | 4 | 0.6 | 2.0 | 6 | 0.6 | 2.4 | 8 | 0.7 | 2.8 | 11 | 0.8 | 3.3 | 14 | 0.9 | 3.7 | 18 | 1.0 | 4.2 | 22 | 1.1 | 4.8 | 27 |
| Moxico | Alto Zambeze | Kaquemgue | 2.99 | 0.0 | 0.0 | 0 | 0.3 | 0.8 | 1 | 0.7 | 2.1 | 3 | 1.2 | 3.8 | 7 | 1.8 | 6.1 | 13 | 2.6 | 8.8 | 22 | 3.3 | 11.7 | 33 | 3.9 | 14.2 | 48 | 4.4 | 16.8 | 64 | 5.0 | 19.5 | 84 | 5.6 | 22.4 | 106 | 6.1 | 25.4 | 132 | 6.7 | 28.6 | 160 |
| Moxico | Alto Zambeze | Mucondo | 2.99 | 0.0 | 0.0 | 0 | 0.1 | 0.3 | 0 | 0.2 | 0.7 | 1 | 0.4 | 1.2 | 2 | 0.6 | 2.0 | 4 | 0.8 | 2.8 | 7 | 1.1 | 3.8 | 11 | 1.2 | 4.6 | 15 | 1.4 | 5.4 | 21 | 1.6 | 6.3 | 27 | 1.8 | 7.2 | 34 | 2.0 | 8.2 | 42 | 2.2 | 9.2 | 52 |
| Moxico | Alto Zambeze | Kavungo | 2.99 | 0.4 | 1.2 | 1 | 0.7 | 2.1 | 3 | 1.1 | 3.6 | 7 | 1.7 | 5.5 | 12 | 2.4 | 8.0 | 20 | 3.2 | 11.1 | 32 | 4.0 | 14.3 | 46 | 4.6 | 17.1 | 63 | 5.3 | 20.0 | 83 | 5.9 | 23.0 | 106 | 6.5 | 26.2 | 132 | 7.2 | 29.6 | 162 | 7.8 | 33.2 | 195 |
| Namibe | Namibe | Lucira | 2.82 | 5.1 | 14.3 | 14 | 5.1 | 14.9 | 29 | 5.2 | 15.7 | 45 | 5.4 | 16.5 | 61 | 5.5 | 17.6 | 79 | 5.7 | 18.7 | 98 | 5.9 | 19.9 | 118 | 6.1 | 21.0 | 139 | 6.2 | 22.2 | 161 | 6.4 | 23.4 | 184 | 6.5 | 24.7 | 209 | 6.7 | 26.0 | 235 | 6.8 | 27.4 | 262 |
| Namibe | Namibe | Bentiaba | 2.82 | 2.1 | 5.8 | 6 | 2.2 | 6.5 | 12 | 2.5 | 7.5 | 20 | 2.8 | 8.7 | 28 | 3.2 | 10.3 | 39 | 3.7 | 12.2 | 51 | 4.2 | 14.1 | 65 | 4.6 | 15.9 | 81 | 4.9 | 17.7 | 99 | 5.3 | 19.6 | 118 | 5.7 | 21.5 | 140 | 6.1 | 23.6 | 163 | 6.4 | 25.8 | 189 |
| Namibe | Tômbua | Baía dos Tigres | 2.82 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 |
| Namibe | Virei | Cainde | 2.82 | 1.4 | 4.0 | 4 | 1.9 | 5.6 | 10 | 2.7 | 8.2 | 18 | 3.7 | 11.5 | 29 | 5.0 | 15.8 | 45 | 6.4 | 21.0 | 66 | 7.9 | 26.6 | 93 | 9.0 | 31.2 | 124 | 10.1 | 36.2 | 160 | 11.2 | 41.4 | 201 | 12.4 | 46.9 | 248 | 13.5 | 52.7 | 301 | 14.6 | 58.8 | 360 |
| Namibe | Bibala | Caitou | 2.82 | 2.0 | 5.6 | 6 | 2.1 | 6.0 | 12 | 2.2 | 6.5 | 18 | 2.3 | 7.2 | 25 | 2.5 | 8.0 | 33 | 2.8 | 9.0 | 42 | 3.0 | 10.0 | 52 | 3.2 | 11.0 | 63 | 3.3 | 11.9 | 75 | 3.5 | 12.9 | 88 | 3.7 | 14.0 | 102 | 3.9 | 15.1 | 117 | 4.0 | 16.2 | 133 |
| Namibe | Bibala | Lola | 2.82 | 0.9 | 2.5 | 2 | 1.0 | 3.0 | 5 | 1.3 | 3.8 | 9 | 1.6 | 4.9 | 14 | 2.0 | 6.3 | 20 | 2.4 | 8.0 | 28 | 2.9 | 9.7 | 38 | 3.2 | 11.2 | 49 | 3.6 | 12.8 | 62 | 3.9 | 14.5 | 77 | 4.3 | 16.2 | 93 | 4.6 | 18.1 | 111 | 5.0 | 20.0 | 131 |
| Namibe | Bibala | Kapangombe | 2.82 | 3.0 | 8.4 | 8 | 3.1 | 9.1 | 18 | 3.3 | 10.0 | 28 | 3.6 | 11.1 | 39 | 3.9 | 12.5 | 51 | 4.3 | 14.2 | 65 | 4.7 | 15.9 | 81 | 5.0 | 17.5 | 99 | 5.3 | 19.1 | 118 | 5.6 | 20.8 | 139 | 5.9 | 22.5 | 161 | 6.2 | 24.4 | 186 | 6.5 | 26.3 | 212 |
| Namibe | Camucuio | Mámue | 2.82 | 1.0 | 2.8 | 3 | 1.1 | 3.1 | 6 | 1.2 | 3.5 | 9 | 1.3 | 4.0 | 13 | 1.5 | 4.7 | 18 | 1.7 | 5.5 | 24 | 1.9 | 6.4 | 30 | 2.1 | 7.2 | 37 | 2.2 | 7.9 | 45 | 2.4 | 8.8 | 54 | 2.5 | 9.6 | 64 | 2.7 | 10.5 | 74 | 2.9 | 11.5 | 86 |
| Namibe | Camucuio | Chingo | 2.82 | 1.8 | 5.1 | 5 | 1.8 | 5.3 | 10 | 1.9 | 5.6 | 16 | 1.9 | 5.9 | 22 | 2.0 | 6.3 | 28 | 2.1 | 6.8 | 35 | 2.2 | 7.3 | 42 | 2.2 | 7.7 | 50 | 2.3 | 8.2 | 58 | 2.3 | 8.6 | 67 | 2.4 | 9.1 | 76 | 2.5 | 9.6 | 86 | 2.5 | 10.2 | 96 |
| Uige (2) | Ambuíla | Quipedro | 3.12 | 0.0 | 0.0 | 0 | 0.2 | 0.8 | 1 | 0.7 | 2.5 | 3 | 1.3 | 4.5 | 8 | 1.8 | 6.2 | 14 | 2.0 | 7.3 | 21 | 2.1 | 7.8 | 29 | 2.1 | 8.2 | 37 | 2.2 | 8.7 | 46 | 2.2 | 9.1 | 55 | 2.3 | 9.6 | 65 | 2.3 | 10.1 | 75 | 2.4 | 10.6 | 85 |
| Uige (2) | Songo | Kinvuenga | 3.12 | 3.2 | 10.0 | 10 | 3.4 | 10.9 | 21 | 3.8 | 12.6 | 33 | 4.3 | 14.5 | 48 | 4.6 | 16.3 | 64 | 4.8 | 17.4 | 82 | 4.9 | 18.2 | 100 | 4.9 | 18.9 | 119 | 5.0 | 19.7 | 139 | 5.0 | 20.4 | 159 | 5.0 | 21.2 | 180 | 5.1 | 22.0 | 202 | 5.1 | 22.8 | 225 |
| Uige (2) | Bembe | Lucunga | 3.12 | 4.2 | 13.0 | 13 | 4.8 | 15.3 | 28 | 6.0 | 19.9 | 48 | 7.4 | 25.4 | 74 | 8.6 | 30.1 | 104 | 9.2 | 33.2 | 137 | 9.4 | 35.0 | 172 | 9.5 | 36.5 | 208 | 9.6 | 38.1 | 246 | 9.8 | 39.7 | 286 | 9.9 | 41.4 | 327 | 10.0 | 43.2 | 371 | 10.1 | 45.1 | 416 |
| Uige (2) | Bembe | Mabaia | 3.12 | 0.0 | 0.0 | 0 | 0.3 | 1.0 | 1 | 0.9 | 3.1 | 4 | 1.7 | 5.6 | 10 | 2.2 | 7.8 | 18 | 2.5 | 9.1 | 27 | 2.6 | 9.8 | 36 | 2.7 | 10.3 | 47 | 2.8 | 10.9 | 58 | 2.8 | 11.5 | 69 | 2.9 | 12.1 | 81 | 2.9 | 12.7 | 94 | 3.0 | 13.4 | 107 |
| Uige (2) | Negage | Dimuca | 3.12 | 1.0 | 3.1 | 3 | 1.8 | 5.8 | 9 | 3.5 | 11.6 | 20 | 5.4 | 18.5 | 39 | 6.9 | 24.4 | 63 | 7.7 | 28.0 | 91 | 8.0 | 29.9 | 121 | 8.2 | 31.4 | 153 | 8.4 | 33.0 | 186 | 8.5 | 34.7 | 220 | 8.7 | 36.5 | 257 | 8.9 | 38.3 | 295 | 9.0 | 40.2 | 335 |
| Uige (2) | Negage | Quisseque | 3.12 | 0.0 | 0.0 | 0 | 0.5 | 1.7 | 2 | 1.6 | 5.4 | 7 | 2.9 | 9.9 | 17 | 3.9 | 13.7 | 31 | 4.4 | 16.0 | 47 | 4.6 | 17.1 | 64 | 4.7 | 18.1 | 82 | 4.8 | 19.0 | 101 | 4.9 | 20.1 | 121 | 5.0 | 21.1 | 142 | 5.1 | 22.2 | 164 | 5.3 | 23.4 | 188 |
| Uige (2) | Maquela do Zombo | Beu | 3.12 | 0.0 | 0.0 | 0 | 0.1 | 0.2 | 0 | 0.2 | 0.8 | 1 | 0.4 | 1.4 | 2 | 0.6 | 2.0 | 4 | 0.6 | 2.3 | 7 | 0.7 | 2.5 | 9 | 0.7 | 2.6 | 12 | 0.7 | 2.8 | 15 | 0.7 | 2.9 | 18 | 0.7 | 3.1 | 21 | 0.7 | 3.2 | 24 | 0.8 | 3.4 | 27 |
| Uige (2) | Maquela do Zombo | Cuilo Futa | 3.12 | 0.0 | 0.0 | 0 | 0.1 | 0.3 | 0 | 0.3 | 0.9 | 1 | 0.5 | 1.7 | 3 | 0.7 | 2.4 | 5 | 0.8 | 2.8 | 8 | 0.8 | 3.0 | 11 | 0.8 | 3.1 | 14 | 0.8 | 3.3 | 18 | 0.9 | 3.5 | 21 | 0.9 | 3.7 | 25 | 0.9 | 3.9 | 29 | 0.9 | 4.1 | 33 |
| Uige (2) | Maquela do Zombo | Sacandica | 3.12 | 0.0 | 0.0 | 0 | 0.1 | 0.3 | 0 | 0.3 | 0.9 | 1 | 0.5 | 1.6 | 3 | 0.6 | 2.2 | 5 | 0.7 | 2.6 | 8 | 0.8 | 2.8 | 10 | 0.8 | 3.0 | 13 | 0.8 | 3.1 | 17 | 0.8 | 3.3 | 20 | 0.8 | 3.5 | 23 | 0.8 | 3.7 | 27 | 0.9 | 3.8 | 31 |
| Uige (2) | Damba | Lombe | 3.12 | 3.3 | 10.3 | 10 | 4.3 | 13.8 | 24 | 6.4 | 21.1 | 45 | 8.7 | 29.8 | 75 | 10.6 | 37.3 | 112 | 11.6 | 42.0 | 154 | 12.0 | 44.6 | 199 | 12.2 | 46.7 | 246 | 12.4 | 48.9 | 295 | 12.6 | 51.2 | 346 | 12.8 | 53.6 | 399 | 13.0 | 56.1 | 456 | 13.2 | 58.7 | 514 |
| Uige (2) | Damba | Lemboa | 3.12 | 0.0 | 0.0 | 0 | 1.1 | 3.6 | 4 | 3.5 | 11.6 | 15 | 6.2 | 21.2 | 36 | 8.3 | 29.3 | 66 | 9.5 | 34.3 | 100 | 9.9 | 36.8 | 137 | 10.1 | 38.8 | 176 | 10.3 | 40.9 | 216 | 10.6 | 43.1 | 260 | 10.8 | 45.3 | 305 | 11.0 | 47.7 | 353 | 11.3 | 50.2 | 403 |
| Uige (2) | Damba | Pete-Cusso (ex S | 3.12 | 0.0 | 0.0 | 0 | 0.5 | 1.7 | 2 | 1.6 | 5.4 | 7 | 2.9 | 9.9 | 17 | 3.9 | 13.7 | 31 | 4.4 | 16.0 | 47 | 4.6 | 17.1 | 64 | 4.7 | 18.1 | 82 | 4.8 | 19.0 | 101 | 4.9 | 20.1 | 121 | 5.0 | 21.1 | 142 | 5.1 | 22.2 | 164 | 5.3 | 23.4 | 188 |
| Uige (2) | Damba | Camatambo | 3.12 | 0.0 | 0.0 | 0 | 0.6 | 2.1 | 2 | 2.0 | 6.6 | 9 | 3.5 | 12.1 | 21 | 4.8 | 16.8 | 38 | 5.4 | 19.6 | 57 | 5.6 | 21.1 | 78 | 5.8 | 22.2 | 100 | 5.9 | 23.4 | 124 | 6.1 | 24.6 | 149 | 6.2 | 26.0 | 174 | 6.3 | 27.3 | 202 | 6.5 | 28.7 | 231 |
| Uige (2) | Kangola | Caiongo | 3.12 | 4.6 | 14.2 | 14 | 8.4 | 27.1 | 41 | 16.6 | 54.8 | 96 | 25.8 | 88.2 | 184 | 33.2 | 116.6 | 301 | 37.1 | 134.2 | 435 | 38.4 | 143.2 | 578 | 39.2 | 150.6 | 729 | 40.0 | 158.3 | 887 | 40.8 | 166.4 | 1,054 | 41.6 | 174.7 | 1,228 | 42.5 | 183.5 | 1,412 | 43.3 | 192.6 | 1,604 |
| Uige (2) | Kangola | Bengo | 3.12 | 2.5 | 7.8 | 8 | 3.6 | 11.6 | 19 | 5.9 | 19.7 | 39 | 8.6 | 29.4 | 69 | 10.7 | 37.7 | 106 | 11.8 | 42.9 | 149 | 12.2 | 45.6 | 195 | 12.5 | 47.9 | 243 | 12.7 | 50.2 | 293 | 12.9 | 52.7 | 345 | 13.2 | 55.2 | 401 | 13.4 | 57.9 | 459 | 13.6 | 60.6 | 519 |
| Uige (2) | Sanza Pombo | Alfândega | 3.12 | 0.0 | 0.0 | 0 | 0.7 | 2.3 | 2 | 2.3 | 7.5 | 10 | 4.0 | 13.6 | 23 | 5.4 | 18.9 | 42 | 6.1 | 22.1 | 64 | 6.4 | 23.7 | 88 | 6.5 | 25.0 | 113 | 6.7 | 26.4 | 140 | 6.8 | 27.8 | 167 | 7.0 | 29.2 | 197 | 7.1 | 30.8 | 227 | 7.3 | 32.4 | 260 |
| Uige (2) | Sanza Pombo | Cuilo Pombo | 3.12 | 2.0 | 6.2 | 6 | 2.4 | 7.6 | 14 | 3.1 | 10.3 | 24 | 3.9 | 13.5 | 38 | 4.6 | 16.2 | 54 | 5.0 | 18.0 | 72 | 5.1 | 19.0 | 91 | 5.2 | 19.8 | 111 | 5.2 | 20.7 | 131 | 5.3 | 21.7 | 153 | 5.4 | 22.6 | 176 | 5.5 | 23.6 | 199 | 5.5 | 24.6 | 224 |
| Uige (2) | Sanza Pombo | Uamba | 3.12 | 2.9 | 9.1 | 9 | 3.4 | 11.0 | 20 | 4.5 | 14.8 | 35 | 5.7 | 19.4 | 54 | 6.7 | 23.4 | 78 | 7.2 | 25.9 | 104 | 7.3 | 27.4 | 131 | 7.4 | 28.6 | 160 | 7.6 | 29.9 | 189 | 7.7 | 31.2 | 221 | 7.8 | 32.6 | 253 | 7.9 | 34.0 | 287 | 8.0 | 35.5 | 323 |
| Uige (2) | Quitexe | Vista Alegre | 3.12 | 1.6 | 5.0 | 5 | 2.1 | 6.8 | 12 | 3.2 | 10.6 | 22 | 4.4 | 15.1 | 38 | 5.4 | 19.0 | 57 | 5.9 | 21.5 | 78 | 6.1 | 22.8 | 101 | 6.2 | 23.9 | 125 | 6.3 | 25.0 | 150 | 6.4 | 26.2 | 176 | 6.5 | 27.4 | 203 | 6.6 | 28.7 | 232 | 6.8 | 30.1 | 262 |
| Uige (2) | Quitexe | Aldeia de Viçosa | 3.12 | 0.4 | 1.2 | 1 | 1.1 | 3.4 | 5 | 2.5 | 8.3 | 13 | 4.2 | 14.2 | 27 | 5.5 | 19.3 | 46 | 6.2 | 22.3 | 69 | 6.4 | 23.9 | 93 | 6.6 | 25.2 | 118 | 6.7 | 26.5 | 144 | 6.8 | 27.9 | 172 | 7.0 | 29.3 | 201 | 7.1 | 30.8 | 232 | 7.3 | 32.4 | 265 |
| Uige (2) | Quitexe | Cambamba | 3.12 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 2.1 | 3 | 1.1 | 3.8 | 7 | 1.5 | 5.3 | 12 | 1.7 | 6.2 | 18 | 1.8 | 6.7 | 25 | 1.8 | 7.0 | 32 | 1.9 | 7.4 | 39 | 1.9 | 7.8 | 47 | 2.0 | 8.2 | 55 | 2.0 | 8.7 | 64 | 2.0 | 9.1 | 73 |
| Uige (2) | Quimbele | Icoca | 3.12 | 0.0 | 0.0 | 0 | 0.8 | 2.5 | 3 | 2.4 | 8.1 | 11 | 4.3 | 14.8 | 25 | 5.8 | 20.5 | 46 | 6.6 | 24.0 | 70 | 6.9 | 25.8 | 96 | 7.1 | 27.2 | 123 | 7.2 | 28.6 | 152 | 7.4 | 30.2 | 182 | 7.6 | 31.8 | 214 | 7.7 | 33.4 | 247 | 7.9 | 35.2 | 282 |
| Uige (2) | Quimbele | Cuango | 3.12 | 0.0 | 0.0 | 0 | 0.7 | 2.2 | 2 | 2.1 | 7.0 | 9 | 3.7 | 12.8 | 22 | 5.0 | 17.7 | 40 | 5.7 | 20.7 | 60 | 6.0 | 22.2 | 82 | 6.1 | 23.4 | 106 | 6.2 | 24.7 | 131 | 6.4 | 26.0 | 157 | 6.5 | 27.3 | 184 | 6.7 | 28.8 | 213 | 6.8 | 30.3 | 243 |
| Uige (2) | Quimbele | Alto-Zaza | 3.12 | 0.0 | 0.0 | 0 | 1.0 | 3.1 | 3 | 3.0 | 9.8 | 13 | 5.2 | 17.9 | 31 | 7.1 | 24.8 | 56 | 8.0 | 29.0 | 84 | 8.3 | 31.1 | 116 | 8.5 | 32.8 | 148 | 8.7 | 34.5 | 183 | 8.9 | 36.4 | 219 | 9.1 | 38.3 | 258 | 9.3 | 40.3 | 298 | 9.5 | 42.4 | 340 |
| Uige (2) | Milunga | Macocola | 3.12 | 2.0 | 6.2 | 6 | 2.2 | 7.1 | 13 | 2.6 | 8.6 | 22 | 3.1 | 10.5 | 32 | 3.4 | 12.1 | 45 | 3.6 | 13.2 | 58 | 3.7 | 13.8 | 72 | 3.7 | 14.4 | 86 | 3.8 | 15.0 | 101 | 3.8 | 15.6 | 117 | 3.9 | 16.2 | 133 | 3.9 | 16.9 | 150 | 4.0 | 17.6 | 167 |
| Uige (2) | Milunga | Macolo | 3.12 | 0.0 | 0.0 | 0 | 0.0 | 0.1 | 0 | 0.1 | 0.4 | 1 | 0.2 | 0.8 | 1 | 0.3 | 1.1 | 2 | 0.3 | 1.2 | 4 | 0.4 | 1.3 | 5 | 0.4 | 1.4 | 6 | 0.4 | 1.5 | 8 | 0.4 | 1.6 | 9 | 0.4 | 1.6 | 11 | 0.4 | 1.7 | 13 | 0.4 | 1.8 | 14 |
| Uige (2) | Milunga | Massau | 3.12 | 0.0 | 0.0 | 0 | 0.1 | 0.3 | 0 | 0.3 | 1.0 | 1 | 0.5 | 1.8 | 3 | 0.7 | 2.4 | 5 | 0.8 | 2.9 | 8 | 0.8 | 3.1 | 11 | 0.8 | 3.2 | 15 | 0.9 | 3.4 | 18 | 0.9 | 3.6 | 22 | 0.9 | 3.8 | 25 | 0.9 | 4.0 | 29 | 0.9 | 4.2 | 34 |
| Uige (2) | Mucaba | Mucaba | 3.12 | 2.5 | 7.8 | 8 | 6.0 | 19.1 | 27 | 13.2 | 43.7 | 71 | 21.5 | 73.3 | 144 | 28.1 | 98.6 | 243 | 31.5 | 114.0 | 357 | 32.7 | 121.9 | 479 | 33.4 | 128.4 | 607 | 34.2 | 135.1 | 742 | 34.9 | 142.0 | 884 | 35.6 | 149.3 | 1,033 | 36.3 | 156.9 | 1,190 | 37.0 | 164.8 | 1,355 |
| Uige (2) | Mucaba | Uando | 3.12 | 0.0 | 0.0 | 0 | 0.8 | 2.6 | 3 | 2.5 | 8.4 | 11 | 4.5 | 15.3 | 26 | 6.0 | 21.2 | 47 | 6.8 | 24.7 | 72 | 7.1 | 26.5 | 99 | 7.3 | 28.0 | 127 | 7.5 | 29.5 | 156 | 7.6 | 31.1 | 187 | 7.8 | 32.7 | 220 | 8.0 | 34.4 | 254 | 8.1 | 36.2 | 291 |
| Uige (2) | Nova Esperança | Camboso | 3.12 | 0.0 | 0.0 | 0 | 1.0 | 3.1 | 3 | 3.0 | 9.9 | 13 | 5.3 | 18.2 | 31 | 7.2 | 25.2 | 56 | 8.1 | 29.4 | 86 | 8.5 | 31.6 | 117 | 8.7 | 33.3 | 151 | 8.9 | 35.1 | 186 | 9.1 | 36.9 | 223 | 9.3 | 38.9 | 261 | 9.5 | 40.9 | 302 | 9.7 | 43.1 | 345 |
| Uige (2) | Nova Esperança | Buenga Sul | 3.12 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.7 | 2.2 | 3 | 1.2 | 4.0 | 7 | 1.6 | 5.5 | 12 | 1.8 | 6.4 | 19 | 1.8 | 6.9 | 26 | 1.9 | 7.2 | 33 | 1.9 | 7.6 | 40 | 2.0 | 8.0 | 48 | 2.0 | 8.5 | 57 | 2.1 | 8.9 | 66 | 2.1 | 9.4 | 75 |
| Zaire | Mbanza Congo | Luvo | 3.00 | 0.0 | 0.0 | 0 | 0.2 | 0.7 | 1 | 0.6 | 1.8 | 3 | 1.0 | 3.3 | 6 | 1.5 | 5.2 | 11 | 2.2 | 7.6 | 19 | 2.8 | 10.0 | 29 | 3.3 | 12.1 | 41 | 3.8 | 14.4 | 55 | 4.3 | 16.7 | 72 | 4.8 | 19.2 | 91 | 5.2 | 21.7 | 113 | 5.7 | 24.5 | 137 |
| Zaire | Mbanza Congo | Madimba | 3.00 | 0.3 | 1.0 | 1 | 0.4 | 1.2 | 2 | 0.5 | 1.4 | 4 | 0.6 | 1.8 | 5 | 0.7 | 2.3 | 8 | 0.8 | 2.9 | 11 | 1.0 | 3.5 | 14 | 1.1 

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| **PROJECTION BY MUNICIPALITY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | Caxito (Dande) | | 3.02 | 10.6 | 32 | 32 | 11.2 | 35 | 67 | 12.2 | 39 | 106 | 13.4 | 44 | 150 | 14.9 | 51 | 201 | 16.7 | 59 | 259 | 18.5 | 67 | 326 | 19.9 | 74 | 400 | 21.3 | 81 | 481 | 22.7 | 89 | 570 | 24.0 | 97 | 668 | 25.4 | 106 | 774 | 26.8 | 115 | 889 |
| Bengo | Catete (Icolo e Bengo) | | 3.02 | 5.6 | 17 | 17 | 6.0 | 19 | 35 | 6.6 | 21 | 57 | 7.4 | 24 | 81 | 8.4 | 29 | 109 | 9.6 | 33 | 143 | 10.7 | 39 | 181 | 11.6 | 43 | 225 | 12.5 | 48 | 272 | 13.4 | 53 | 325 | 14.3 | 58 | 383 | 15.2 | 63 | 446 | 16.1 | 69 | 515 |
| Bengo | Quissama | | 3.02 | 0.0 | 0 | 0 | 0.5 | 1 | 1 | 1.2 | 4 | 5 | 2.0 | 7 | 12 | 3.2 | 11 | 23 | 4.4 | 16 | 38 | 5.7 | 21 | 59 | 6.7 | 25 | 84 | 7.7 | 29 | 113 | 8.7 | 34 | 147 | 9.7 | 39 | 187 | 10.7 | 45 | 231 | 11.7 | 50 | 282 |
| Bengo | Ambriz | | 3.02 | 1.5 | 4 | 4 | 1.5 | 5 | 9 | 1.5 | 5 | 14 | 1.6 | 5 | 19 | 1.7 | 6 | 25 | 1.7 | 6 | 31 | 1.8 | 7 | 37 | 1.9 | 7 | 44 | 2.0 | 7 | 52 | 2.0 | 8 | 60 | 2.1 | 8 | 68 | 2.2 | 9 | 77 | 2.2 | 10 | 87 |
| Bengo | Nambuangongo | | 3.02 | 3.4 | 10 | 10 | 4.5 | 14 | 24 | 6.1 | 19 | 44 | 8.1 | 27 | 70 | 10.6 | 36 | 106 | 13.5 | 47 | 154 | 16.5 | 59 | 213 | 18.7 | 69 | 282 | 21.0 | 80 | 362 | 23.2 | 91 | 454 | 25.5 | 103 | 557 | 27.8 | 116 | 673 | 30.0 | 129 | 802 |
| Bengo | Bula - Atumba | | 3.02 | 0.0 | 0 | 0 | 0.2 | 1 | 1 | 0.4 | 1 | 2 | 0.7 | 2 | 4 | 1.1 | 4 | 8 | 1.6 | 6 | 14 | 2.0 | 7 | 21 | 2.4 | 9 | 30 | 2.7 | 10 | 40 | 3.1 | 12 | 52 | 3.4 | 14 | 66 | 3.8 | 16 | 82 | 4.2 | 18 | 100 |
| Bengo | Dembos | | 3.02 | 2.7 | 8 | 8 | 3.4 | 11 | 19 | 4.5 | 14 | 33 | 5.9 | 19 | 52 | 7.6 | 26 | 78 | 9.6 | 34 | 112 | 11.6 | 42 | 154 | 13.2 | 49 | 202 | 14.7 | 56 | 259 | 16.3 | 64 | 323 | 17.9 | 72 | 395 | 19.4 | 81 | 477 | 21.0 | 90 | 567 |
| Bengo | Pango - Aluquém | | 3.02 | 1.4 | 4 | 4 | 1.7 | 5 | 10 | 2.1 | 7 | 16 | 2.5 | 8 | 25 | 3.1 | 11 | 35 | 3.8 | 13 | 48 | 4.5 | 16 | 65 | 5.0 | 19 | 83 | 5.5 | 21 | 104 | 6.1 | 24 | 128 | 6.6 | 27 | 155 | 7.1 | 30 | 185 | 7.7 | 33 | 218 |
| Benguela | Benguela | | 2.86 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Benguela | Baía Farta | | 2.86 | 9.2 | 26 | 26 | 9.3 | 28 | 54 | 9.6 | 29 | 83 | 9.9 | 31 | 114 | 10.3 | 33 | 147 | 10.7 | 35 | 182 | 11.1 | 38 | 220 | 11.5 | 40 | 261 | 11.8 | 43 | 304 | 12.1 | 45 | 349 | 12.5 | 48 | 397 | 12.8 | 51 | 448 | 13.1 | 54 | 501 |
| Benguela | Lobito | | 2.86 | 10.2 | 29 | 29 | 11.5 | 34 | 63 | 13.6 | 41 | 104 | 16.2 | 51 | 155 | 19.4 | 63 | 218 | 23.2 | 77 | 295 | 27.0 | 92 | 387 | 29.9 | 105 | 492 | 32.8 | 119 | 611 | 35.8 | 134 | 745 | 38.7 | 149 | 894 | 41.6 | 165 | 1,059 | 44.5 | 182 | 1,241 |
| Benguela | Cubal | | 2.86 | 18.5 | 53 | 53 | 21.4 | 63 | 116 | 25.8 | 78 | 194 | 31.2 | 98 | 292 | 38.2 | 123 | 415 | 46.2 | 153 | 568 | 54.2 | 185 | 754 | 60.4 | 213 | 966 | 66.6 | 241 | 1,208 | 72.8 | 272 | 1,480 | 79.0 | 304 | 1,783 | 85.1 | 337 | 2,121 | 91.3 | 373 | 2,494 |
| Benguela | Ganda | | 2.86 | 12.5 | 36 | 36 | 14.3 | 42 | 78 | 17.0 | 52 | 130 | 20.4 | 64 | 193 | 24.6 | 79 | 273 | 29.6 | 98 | 371 | 34.5 | 118 | 489 | 38.4 | 135 | 624 | 42.2 | 153 | 777 | 46.0 | 172 | 949 | 49.8 | 192 | 1,141 | 53.7 | 213 | 1,353 | 57.5 | 235 | 1,588 |
| Benguela | Balombo | | 2.86 | 12.9 | 37 | 37 | 13.8 | 41 | 77 | 15.1 | 46 | 123 | 16.7 | 52 | 176 | 18.8 | 61 | 236 | 21.3 | 71 | 307 | 23.7 | 81 | 388 | 25.6 | 90 | 478 | 27.5 | 100 | 578 | 29.4 | 110 | 687 | 31.2 | 120 | 808 | 33.1 | 131 | 939 | 35.0 | 143 | 1,082 |
| Benguela | Bocoio | | 2.86 | 18.5 | 53 | 53 | 20.2 | 60 | 113 | 22.7 | 69 | 182 | 25.9 | 81 | 263 | 29.9 | 96 | 359 | 34.6 | 115 | 474 | 39.2 | 134 | 608 | 42.8 | 151 | 759 | 46.4 | 168 | 927 | 50.0 | 187 | 1,113 | 53.6 | 206 | 1,320 | 57.2 | 227 | 1,546 | 60.7 | 248 | 1,794 |
| Benguela | Caimbambo | | 2.86 | 5.5 | 16 | 16 | 5.8 | 17 | 33 | 6.3 | 19 | 52 | 7.0 | 22 | 74 | 7.8 | 25 | 99 | 8.7 | 29 | 128 | 9.6 | 33 | 161 | 10.3 | 36 | 197 | 11.0 | 40 | 237 | 11.7 | 44 | 281 | 12.4 | 48 | 329 | 13.2 | 52 | 381 | 13.9 | 57 | 437 |
| Benguela | Chongoroi | | 2.86 | 5.8 | 17 | 17 | 5.9 | 17 | 34 | 6.0 | 18 | 52 | 6.2 | 19 | 72 | 6.4 | 21 | 92 | 6.6 | 22 | 114 | 6.8 | 23 | 137 | 7.0 | 25 | 162 | 7.2 | 26 | 188 | 7.4 | 28 | 216 | 7.6 | 29 | 245 | 7.7 | 31 | 276 | 7.9 | 32 | 308 |
| Bié | Andulo | | 2.94 | 2.6 | 8 | 8 | 5.0 | 15 | 23 | 8.7 | 27 | 50 | 13.2 | 42 | 92 | 19.0 | 63 | 155 | 25.6 | 87 | 243 | 32.3 | 113 | 356 | 37.4 | 135 | 491 | 42.6 | 159 | 650 | 47.7 | 183 | 833 | 52.9 | 209 | 1,042 | 58.0 | 236 | 1,279 | 63.2 | 265 | 1,543 |
| Bié | Camacupa | | 2.94 | 1.4 | 4 | 4 | 2.9 | 9 | 13 | 5.1 | 16 | 29 | 8.0 | 26 | 54 | 11.6 | 38 | 93 | 15.7 | 54 | 146 | 19.9 | 70 | 216 | 23.1 | 83 | 300 | 26.3 | 98 | 398 | 29.5 | 113 | 511 | 32.7 | 129 | 640 | 35.9 | 146 | 786 | 39.1 | 164 | 950 |
| Bié | Catabola | | 2.94 | 5.5 | 16 | 16 | 7.1 | 22 | 38 | 9.6 | 30 | 68 | 12.7 | 41 | 109 | 16.6 | 55 | 164 | 21.1 | 72 | 236 | 25.7 | 90 | 326 | 29.2 | 106 | 431 | 32.7 | 122 | 553 | 36.2 | 139 | 692 | 39.7 | 157 | 849 | 43.2 | 176 | 1,025 | 46.7 | 196 | 1,220 |
| Bié | Chinguar | | 2.94 | 1.1 | 3 | 3 | 2.4 | 7 | 11 | 4.3 | 13 | 24 | 6.6 | 21 | 45 | 9.6 | 32 | 77 | 13.1 | 45 | 122 | 16.6 | 58 | 180 | 19.2 | 70 | 249 | 21.9 | 82 | 331 | 24.6 | 94 | 425 | 27.3 | 108 | 533 | 29.9 | 122 | 655 | 32.6 | 137 | 792 |
| Bié | Chitembo | | 2.94 | 4.0 | 12 | 12 | 4.4 | 13 | 25 | 5.0 | 16 | 41 | 5.8 | 19 | 59 | 6.8 | 22 | 82 | 7.9 | 27 | 109 | 9.1 | 32 | 141 | 9.9 | 36 | 177 | 10.8 | 40 | 217 | 11.7 | 45 | 262 | 12.6 | 50 | 311 | 13.4 | 55 | 366 | 14.3 | 60 | 426 |
| Bié | Cuemba | | 2.94 | 1.8 | 5 | 5 | 1.9 | 6 | 11 | 2.0 | 6 | 17 | 2.2 | 7 | 24 | 2.5 | 8 | 33 | 2.8 | 10 | 42 | 3.1 | 11 | 53 | 3.3 | 12 | 65 | 3.6 | 13 | 79 | 3.8 | 15 | 93 | 4.1 | 16 | 109 | 4.3 | 17 | 127 | 4.5 | 19 | 146 |
| Bié | Cunhinga (Vouga) | | 2.94 | 0.0 | 0 | 0 | 0.8 | 2 | 2 | 1.9 | 6 | 8 | 3.2 | 10 | 19 | 5.0 | 16 | 35 | 7.0 | 24 | 59 | 9.0 | 32 | 90 | 10.5 | 38 | 128 | 12.1 | 45 | 173 | 13.7 | 52 | 226 | 15.2 | 60 | 286 | 16.8 | 68 | 354 | 18.3 | 77 | 431 |
| Bié | Kuito | | 2.94 | 37.3 | 110 | 110 | 43.2 | 131 | 240 | 51.9 | 162 | 402 | 62.9 | 202 | 604 | 76.7 | 254 | 858 | 92.8 | 316 | 1,175 | 108.9 | 382 | 1,557 | 121.3 | 439 | 1,996 | 133.7 | 498 | 2,494 | 146.1 | 561 | 3,055 | 158.5 | 627 | 3,681 | 171.0 | 696 | 4,377 | 183.4 | 769 | 5,146 |
| Bié | Nharea | | 2.94 | 2.5 | 7 | 7 | 3.5 | 10 | 18 | 4.9 | 15 | 33 | 6.7 | 22 | 55 | 9.0 | 30 | 85 | 11.7 | 40 | 124 | 14.4 | 50 | 175 | 16.4 | 59 | 234 | 18.5 | 69 | 303 | 20.5 | 79 | 382 | 22.6 | 89 | 471 | 24.7 | 100 | 572 | 26.7 | 112 | 684 |
| Cabinda | Belize | | 2.85 | 2.3 | 7 | 7 | 2.5 | 7 | 14 | 2.9 | 9 | 23 | 3.2 | 10 | 33 | 3.7 | 12 | 45 | 4.3 | 14 | 59 | 4.9 | 17 | 76 | 5.3 | 19 | 94 | 5.8 | 21 | 115 | 6.2 | 23 | 138 | 6.6 | 25 | 164 | 7.1 | 28 | 192 | 7.5 | 31 | 222 |
| Cabinda | Buco Zau | | 2.85 | 3.0 | 9 | 9 | 3.4 | 10 | 19 | 4.0 | 12 | 31 | 4.8 | 15 | 46 | 5.8 | 19 | 64 | 6.9 | 23 | 87 | 8.0 | 27 | 114 | 8.9 | 31 | 146 | 9.8 | 35 | 181 | 10.7 | 40 | 221 | 11.5 | 44 | 265 | 12.4 | 49 | 314 | 13.3 | 54 | 368 |
| Cabinda | Cabinda | | 2.85 | 1.9 | 6 | 6 | 2.9 | 9 | 14 | 4.4 | 13 | 28 | 6.3 | 20 | 47 | 8.7 | 28 | 75 | 11.5 | 38 | 113 | 14.3 | 49 | 162 | 16.4 | 58 | 219 | 18.5 | 67 | 286 | 20.7 | 77 | 363 | 22.8 | 87 | 451 | 25.0 | 98 | 549 | 27.1 | 110 | 659 |
| Cabinda | Cacongo | | 2.85 | 0.0 | 0 | 0 | 0.7 | 2 | 2 | 1.6 | 5 | 7 | 2.9 | 9 | 16 | 4.4 | 14 | 30 | 6.2 | 20 | 50 | 8.0 | 27 | 77 | 9.4 | 33 | 110 | 10.8 | 39 | 149 | 12.1 | 45 | 194 | 13.5 | 52 | 246 | 14.9 | 59 | 305 | 16.3 | 66 | 371 |
| Cunene | Cahama | | 2.83 | 4.6 | 13 | 13 | 4.9 | 14 | 27 | 5.4 | 16 | 44 | 6.0 | 19 | 62 | 6.7 | 21 | 84 | 7.6 | 25 | 109 | 8.5 | 29 | 137 | 9.1 | 32 | 169 | 9.8 | 35 | 204 | 10.5 | 39 | 243 | 11.1 | 42 | 285 | 11.8 | 46 | 331 | 12.5 | 50 | 381 |
| Cunene | Cuanhama | | 2.83 | 5.8 | 16 | 16 | 8.8 | 26 | 42 | 13.2 | 40 | 82 | 18.7 | 58 | 139 | 25.7 | 82 | 221 | 33.8 | 111 | 333 | 42.0 | 142 | 474 | 48.2 | 168 | 642 | 54.5 | 196 | 838 | 60.8 | 225 | 1,063 | 67.1 | 255 | 1,318 | 73.3 | 287 | 1,605 | 79.6 | 321 | 1,927 |
| Cunene | Curoca | | 2.83 | 5.7 | 16 | 16 | 6.2 | 18 | 34 | 6.9 | 21 | 55 | 7.7 | 24 | 79 | 8.7 | 28 | 107 | 10.0 | 33 | 139 | 11.2 | 38 | 177 | 12.1 | 42 | 219 | 13.1 | 47 | 266 | 14.0 | 52 | 318 | 14.9 | 57 | 375 | 15.9 | 62 | 437 | 16.8 | 68 | 505 |
| Cunene | Cuvelai | | 2.83 | 2.4 | 7 | 7 | 4.2 | 12 | 19 | 6.9 | 21 | 40 | 10.3 | 32 | 71 | 14.6 | 46 | 118 | 19.6 | 64 | 182 | 24.5 | 83 | 265 | 28.4 | 99 | 364 | 32.2 | 116 | 480 | 36.1 | 133 | 613 | 39.9 | 152 | 765 | 43.8 | 172 | 936 | 47.6 | 192 | 1,129 |
| Cunene | Namacunde | | 2.83 | 4.8 | 14 | 14 | 6.1 | 18 | 31 | 8.2 | 25 | 56 | 10.7 | 33 | 89 | 13.9 | 44 | 133 | 17.6 | 58 | 191 | 21.3 | 72 | 263 | 24.2 | 84 | 347 | 27.0 | 97 | 444 | 29.9 | 110 | 555 | 32.8 | 125 | 679 | 35.6 | 140 | 819 | 38.5 | 155 | 974 |
| Cunene | Ombadja | | 2.83 | 4.3 | 12 | 12 | 7.3 | 21 | 34 | 11.8 | 35 | 69 | 17.3 | 54 | 123 | 24.4 | 78 | 200 | 32.5 | 107 | 307 | 40.7 | 138 | 445 | 47.0 | 164 | 608 | 53.3 | 191 | 799 | 59.6 | 220 | 1,020 | 65.9 | 251 | 1,270 | 72.2 | 283 | 1,553 | 78.5 | 317 | 1,870 |
| Huambo | Bailundo | | 2.98 | 11.5 | 34 | 34 | 18.4 | 57 | 91 | 33.0 | 104 | 195 | 49.7 | 162 | 357 | 62.9 | 211 | 568 | 69.8 | 241 | 810 | 72.3 | 257 | 1,067 | 73.7 | 270 | 1,337 | 75.2 | 284 | 1,621 | 76.6 | 298 | 1,919 | 78.1 | 313 | 2,232 | 79.5 | 328 | 2,560 | 81.0 | 344 | 2,904 |
| Huambo | Caála | | 2.98 | 13.9 | 42 | 42 | 18.0 | 55 | 97 | 26.7 | 84 | 181 | 36.5 | 119 | 300 | 44.4 | 149 | 449 | 48.5 | 168 | 617 | 49.9 | 178 | 794 | 50.8 | 186 | 981 | 51.6 | 195 | 1,175 | 52.5 | 204 | 1,380 | 53.3 | 214 | 1,593 | 54.2 | 224 | 1,817 | 55.0 | 234 | 2,051 |
| Huambo | Catihihungo | | 2.98 | 8.8 | 26 | 26 | 12.2 | 37 | 64 | 19.3 | 61 | 125 | 27.3 | 89 | 214 | 33.7 | 113 | 327 | 37.1 | 128 | 455 | 38.3 | 136 | 592 | 39.0 | 143 | 734 | 39.7 | 150 | 884 | 40.4 | 157 | 1,041 | 41.1 | 165 | 1,206 | 41.8 | 172 | 1,378 | 42.5 | 181 | 1,559 |
| Huambo | Ecunha | | 2.98 | 3.9 | 12 | 12 | 5.0 | 15 | 27 | 7.2 | 23 | 50 | 9.7 | 32 | 82 | 11.8 | 39 | 121 | 12.8 | 44 | 165 | 13.2 | 47 | 212 | 13.4 | 49 | 261 | 13.6 | 51 | 313 | 13.9 | 54 | 367 | 14.1 | 56 | 423 | 14.3 | 59 | 482 | 14.5 | 62 | 544 |
| Huambo | Huambo | | 2.98 | 11.0 | 33 | 33 | 16.5 | 51 | 84 | 28.0 | 89 | 172 | 41.1 | 134 | 306 | 51.5 | 173 | 479 | 57.0 | 197 | 676 | 58.9 | 210 | 886 | 60.1 | 220 | 1,106 | 61.2 | 231 | 1,338 | 62.4 | 243 | 1,580 | 63.5 | 254 | 1,835 | 64.6 | 267 | 2,101 | 65.8 | 280 | 2,381 |
| Huambo | Londuimbali | | 2.98 | 16.4 | 49 | 49 | 18.8 | 58 | 107 | 23.7 | 75 | 182 | 29.4 | 96 | 277 | 33.9 | 114 | 391 | 36.2 | 125 | 516 | 37.0 | 132 | 648 | 37.5 | 138 | 786 | 38.0 | 144 | 929 | 38.5 | 150 | 1,079 | 39.0 | 156 | 1,235 | 39.5 | 163 | 1,398 | 40.0 | 170 | 1,568 |
| Huambo | Longonjo | | 2.98 | 5.5 | 17 | 17 | 7.5 | 23 | 40 | 11.7 | 37 | 77 | 16.5 | 54 | 130 | 20.2 | 68 | 198 | 22.2 | 77 | 275 | 22.9 | 82 | 357 | 23.3 | 86 | 442 | 23.8 | 90 | 532 | 24.2 | 94 | 626 | 24.6 | 99 | 725 | 25.0 | 103 | 828 | 25.4 | 108 | 936 |
| Huambo | Mungo | | 2.98 | 2.3 | 7 | 7 | 3.6 | 11 | 18 | 6.3 | 20 | 38 | 9.4 | 31 | 68 | 11.8 | 40 | 108 | 13.1 | 45 | 154 | 13.6 | 48 | 202 | 13.9 | 51 | 253 | 14.1 | 53 | 306 | 14.4 | 56 | 362 | 14.7 | 59 | 421 | 14.9 | 62 | 483 | 15.2 | 65 | 547 |
| Huambo | Tchicala-Tcholohanga | | 2.98 | 7.3 | 22 | 22 | 10.3 | 32 | 54 | 16.6 | 52 | 106 | 23.7 | 77 | 183 | 29.4 | 99 | 282 | 32.3 | 112 | 394 | 33.4 | 119 | 512 | 34.0 | 125 | 637 | 34.6 | 131 | 768 | 35.2 | 137 | 905 | 35.9 | 144 | 1,049 | 36.5 | 151 | 1,199 | 37.1 | 158 | 1,357 |
| Huambo | Tchindjenje | | 2.98 | 2.0 | 6 | 6 | 2.4 | 7 | 13 | 3.3 | 11 | 24 | 4.4 | 14 | 38 | 5.3 | 18 | 56 | 5.7 | 20 | 76 | 5.9 | 21 | 96 | 6.0 | 22 | 118 | 6.1 | 23 | 141 | 6.1 | 24 | 165 | 6.2 | 25 | 190 | 6.3 | 26 | 216 | 6.4 | 27 | 244 |
| Huambo | Ucuma | | 2.98 | 1.0 | 3 | 3 | 1.4 | 4 | 7 | 2.2 | 7 | 14 | 3.1 | 10 | 24 | 3.8 | 13 | 37 | 4.1 | 14 | 51 | 4.3 | 15 | 66 | 4.3 | 16 | 82 | 4.4 | 17 | 99 | 4.5 | 17 | 116 | 4.6 | 18 | 134 | 4.6 | 19 | 154 | 4.7 | 20 | 174 |
| Huila | Caconda | | 2.82 | 20.6 | 58 | 58 | 23.8 | 69 | 127 | 28.6 | 86 | 213 | 34.6 | 107 | 320 | 42.2 | 134 | 454 | 51.0 | 167 | 621 | 59.8 | 202 | 823 | 66.6 | 231 | 1,054 | 73.4 | 262 | 1,316 | 80.2 | 295 | 1,612 | 87.0 | 330 | 1,942 | 93.8 | 366 | 2,308 | 100.6 | 405 | 2,713 |
| Huila | Cacula | | 2.82 | 5.2 | 15 | 15 | 6.0 | 17 | 32 | 7.2 | 22 | 54 | 8.7 | 27 | 80 | 10.6 | 34 | 114 | 12.8 | 42 | 156 | 15.0 | 51 | 207 | 16.7 | 58 | 265 | 18.4 | 66 | 330 | 20.1 | 74 | 405 | 21.8 | 83 | 487 | 23.5 | 92 | 579 | 25.2 | 102 | 681 |
| Huila | Caluquembe | | 2.82 | 6.9 | 19 | 19 | 7.7 | 22 | 42 | 9.1 | 27 | 69 | 10.7 | 33 | 102 | 12.8 | 41 | 143 | 15.2 | 50 | 193 | 17.6 | 60 | 252 | 19.5 | 68 | 320 | 21.4 | 77 | 396 | 23.3 | 86 | 482 | 25.1 | 95 | 577 | 27.0 | 106 | 683 | 28.9 | 116 | 799 |
| Huila | Chibia | | 2.82 | 6.8 | 19 | 19 | 6.9 | 20 | 39 | 7.1 | 21 | 61 | 7.3 | 23 | 83 | 7.6 | 24 | 108 | 7.9 | 26 | 133 | 8.2 | 28 | 161 | 8.5 | 29 | 191 | 8.7 | 31 | 222 | 9.0 | 33 | 255 | 9.2 | 35 | 290 | 9.4 | 37 | 327 | 9.7 | 39 | 365 |
| Huila | Chicomba | | 2.82 | 6.0 | 17 | 17 | 6.4 | 19 | 36 | 7.0 | 21 | 57 | 7.8 | 24 | 81 | 8.8 | 28 | 109 | 9.9 | 33 | 141 | 11.1 | 37 | 179 | 12.0 | 42 | 220 | 12.9 | 46 | 266 | 13.7 | 51 | 317 | 14.6 | 55 | 372 | 15.5 | 61 | 433 | 16.4 | 66 | 499 |
| Huila | Chipindo | | 2.82 | 0.8 | 2 | 2 | 0.8 | 2 | 5 | 0.9 | 3 | 7 | 1.0 | 3 | 10 | 1.1 | 3 | 14 | 1.2 | 4 | 18 | 1.3 | 4 | 22 | 1.4 | 5 | 27 | 1.5 | 5 | 33 | 1.6 | 6 | 38 | 1.7 | 6 | 45 | 1.8 | 7 | 52 | 1.9 | 8 | 59 |
| Huila | Gambos | | 2.82 | 24.8 | 70 | 70 | 25.3 | 74 | 144 | 26.0 | 78 | 222 | 27.0 | 83 | 305 | 28.2 | 90 | 394 | 29.6 | 97 | 491 | 31.0 | 104 | 596 | 32.0 | 111 | 707 | 33.1 | 118 | 825 | 34.2 | 126 | 951 | 35.2 | 134 | 1,085 | 36.3 | 142 | 1,227 | 37.4 | 151 | 1,377 |
| Huila | Humpata | | 2.82 | 6.4 | 18 | 18 | 7.4 | 22 | 40 | 9.0 | 27 | 66 | 10.9 | 34 | 100 | 13.4 | 43 | 143 | 16.3 | 53 | 196 | 19.1 | 64 | 260 | 21.3 | 74 | 335 | 23.6 | 84 | 419 | 25.8 | 95 | 514 | 28.0 | 106 | 620 | 30.2 | 118 | 738 | 32.4 | 130 | 868 |
| Huila | Jamba | | 2.82 | 4.9 | 14 | 14 | 6.1 | 18 | 32 | 7.8 | 23 | 55 | 10.0 | 31 | 86 | 12.8 | 41 | 127 | 15.9 | 52 | 179 | 19.1 | 65 | 243 | 21.6 | 75 | 318 | 24.1 | 86 | 404 | 26.5 | 98 | 502 | 29.0 | 110 | 612 | 31.5 | 123 | 735 | 33.9 | 137 | 872 |
| Huila | Kuvango | | 2.82 | 8.9 | 25 | 25 | 9.5 | 28 | 53 | 10.5 | 31 | 84 | 11.7 | 36 | 120 | 13.1 | 42 | 162 | 14.9 | 49 | 211 | 16.6 | 56 | 267 | 17.9 | 62 | 329 | 19.2 | 69 | 398 | 20.6 | 76 | 473 | 21.9 | 83 | 556 | 23.2 | 91 | 647 | 24.5 | 99 | 746 |
| Huila | Lubango | | 2.82 | 26.9 | 76 | 76 | 30.9 | 90 | 166 | 36.8 | 110 | 276 | 44.2 | 137 | 413 | 53.6 | 170 | 583 | 64.5 | 211 | 794 | 75.4 | 254 | 1,049 | 83.8 | 291 | 1,340 | 92.2 | 330 | 1,669 | 100.6 | 371 | 2,040 | 109.0 | 414 | 2,454 | 117.4 | 459 | 2,913 | 125.8 | 507 | 3,419 |
| Huila | Matala | | 2.82 | 19.7 | 56 | 56 | 24.0 | 70 | 126 | 30.5 | 91 | 217 | 38.6 | 119 | 336 | 48.9 | 155 | 492 | 60.8 | 199 | 691 | 72.7 | 245 | 936 | 81.9 | 284 | 1,220 | 91.0 | 326 | 1,546 | 100.2 | 369 | 1,915 | 109.4 | 415 | 2,330 | 118.6 | 464 | 2,794 | 127.8 | 514 | 3,308 |
| Huila | Quilengues | | 2.82 | 7.0 | 20 | 20 | 7.8 | 23 | 43 | 9.1 | 27 | 70 | 10.6 | 33 | 103 | 12.6 | 40 | 143 | 14.9 | 49 | 192 | 17.2 | 58 | 250 | 19.0 | 66 | 316 | 20.8 | 74 | 390 | 22.5 | 83 | 473 | 24.3 | 92 | 565 | 26.1 | 102 | 667 | 27.9 | 112 | 779 |
| Huila | Quipungo | | 2.82 | 12.6 | 35 | 35 | 15.4 | 45 | 80 | 19.7 | 59 | 139 | 25.1 | 77 | 217 | 31.9 | 101 | 318 | 39.7 | 130 | 448 | 47.6 | 161 | 609 | 53.7 | 186 | 795 | 59.8 | 214 | 1,009 | 65.8 | 243 | 1,252 | 71.9 | 273 | 1,524 | 78.0 | 305 | 1,829 | 84.1 | 338 | 2,168 |
| Kuando Kubango | Calai | | 3.15 | 0.0 | 0 | 0 | 0.1 | 0 | 0 | 0.2 | 1 | 1 | 0.3 | 1 | 2 | 0.4 | 1 | 3 | 0.6 | 2 | 5 | 0.8 | 3 | 8 | 0.9 | 3 | 12 | 1.0 | 4 | 16 | 1.2 | 5 | 20 | 1.3 | 5 | 26 | 1.4 | 6 | 32 | 1.6 | 7 | 39 |
| Kuando Kubango | Cuangar | | 3.15 | 0.0 | 0 | 0 | 0.3 | 1 | 1 | 0.6 | 2 | 3 | 1.1 | 4 | 7 | 1.7 | 6 | 13 | 2.4 | 9 | 22 | 3.2 | 12 | 34 | 3.7 | 14 | 48 | 4.2 | 17 | 65 | 4.8 | 20 | 85 | 5.3 | 23 | 108 | 5.9 | 26 | 133 | 6.4 | 29 | 162 |
| Kuando Kubango | Cuchi | | 3.15 | 0.0 | 0 | 0 | 0.5 | 2 | 2 | 1.3 | 4 | 6 | 2.2 | 8 | 13 | 3.4 | 12 | 25 | 4.8 | 17 | 43 | 6.2 | 23 | 66 | 7.2 | 28 | 94 | 8.3 | 33 | 127 | 9.4 | 39 | 166 | 10.4 | 44 | 210 | 11.5 | 50 | 260 | 12.6 | 57 | 317 |
| Kuando Kubango | Cuito Canavale | | 3.15 | 0.0 | 0 | 0 | 0.5 | 2 | 2 | 1.3 | 4 | 6 | 2.3 | 8 | 14 | 3.5 | 12 | 26 | 4.9 | 18 | 44 | 6.4 | 24 | 68 | 7.5 | 29 | 97 | 8.6 | 34 | 132 | 9.7 | 40 | 171 | 10.8 | 46 | 217 | 11.9 | 52 | 269 | 13.0 | 58 | 328 |
| Kuando Kubango | Dirico | | 3.15 | 1.3 | 4 | 4 | 1.5 | 5 | 9 | 1.8 | 6 | 15 | 2.2 | 8 | 23 | 2.7 | 10 | 33 | 3.2 | 12 | 44 | 3.8 | 14 | 59 | 4.2 | 16 | 75 | 4.6 | 18 | 93 | 5.0 | 21 | 114 | 5.5 | 23 | 137 | 5.9 | 26 | 163 | 6.3 | 28 | 191 |
| Kuando Kubango | Longo (Nancova) | | 3.15 | 0.0 | 0 | 0 | 0.1 | 0 | 0 | 0.1 | 0 | 1 | 0.2 | 1 | 2 | 0.4 | 1 | 3 | 0.5 | 2 | 5 | 0.7 | 3 | 7 | 0.8 | 3 | 11 | 0.9 | 4 | 14 | 1.1 | 4 | 19 | 1.2 | 5 | 24 | 1.3 | 6 | 29 | 1.4 | 6 | 36 |
| Kuando Kubango | Mavinga | | 3.15 | 0.0 | 0 | 0 | 0.2 | 1 | 1 | 0.5 | 2 | 2 | 0.9 | 3 | 5 | 1.4 | 5 | 10 | 1.9 | 7 | 17 | 2.5 | 9 | 27 | 2.9 | 11 | 38 | 3.4 | 13 | 51 | 3.8 | 16 | 67 | 4.2 | 18 | 85 | 4.6 | 20 | 105 | 5.1 | 23 | 128 |
| Kuando Kubango | Menongue | | 3.15 | 6.1 | 19 | 19 | 6.6 | 22 | 41 | 7.4 | 25 | 66 | 8.4 | 29 | 95 | 9.7 | 34 | 129 | 11.1 | 41 | 169 | 12.6 | 47 | 217 | 13.7 | 53 | 270 | 14.8 | 59 | 329 | 15.9 | 66 | 394 | 17.1 | 72 | 467 | 18.2 | 79 | 546 | 19.3 | 87 | 633 |
| Kuando Kubango | Rivungo | | 3.15 | 0.0 | 0 | 0 | 0.2 | 1 | 1 | 0.5 | 2 | 2 | 0.8 | 3 | 5 | 1.2 | 4 | 9 | 1.7 | 6 | 15 | 2.2 | 8 | 24 | 2.6 | 10 | 34 | 3.0 | 12 | 46 | 3.4 | 14 | 60 | 3.8 | 16 | 76 | 4.1 | 18 | 94 | 4.5 | 20 | 114 |
| Kuanza Norte | Banga | | 2.99 | 1.0 | 3 | 3 | 1.1 | 3 | 7 | 1.3 | 4 | 11 | 1.4 | 5 | 15 | 1.6 | 6 | 21 | 1.9 | 7 | 27 | 2.1 | 8 | 35 | 2.3 | 9 | 43 | 2.5 | 9 | 53 | 2.7 | 10 | 63 | 2.9 | 12 | 75 | 3.1 | 13 | 88 | 3.3 | 14 | 102 |
| Kuanza Norte | Bolongongo | | 2.99 | 0.3 | 1 | 1 | 0.3 | 1 | 2 | 0.4 | 1 | 3 | 0.5 | 2 | 5 | 0.6 | 2 | 7 | 0.8 | 3 | 10 | 0.9 | 3 | 13 | 1.0 | 4 | 17 | 1.2 | 4 | 21 | 1.3 | 5 | 26 | 1.4 | 6 | 32 | 1.5 | 6 | 38 | 1.6 | 7 | 45 |
| Kuanza Norte | Camabatela (Ambaca) | | 2.99 | 3.3 | 10 | 10 | 4.4 | 14 | 23 | 6.2 | 20 | 43 | 8.4 | 27 | 70 | 11.2 | 38 | 108 | 14.4 | 50 | 158 | 17.6 | 63 | 220 | 20.1 | 74 | 294 | 22.6 | 85 | 380 | 25.0 | 98 | 477 | 27.5 | 111 | 588 | 30.0 | 124 | 712 | 32.5 | 138 | 850 |
| Kuanza Norte | Cambambe | | 2.99 | 0.7 | 2 | 2 | 0.9 | 3 | 5 | 1.4 | 4 | 9 | 2.0 | 6 | 16 | 2.7 | 9 | 25 | 3.5 | 12 | 37 | 4.3 | 15 | 52 | 4.9 | 18 | 70 | 5.6 | 21 | 91 | 6.2 | 24 | 115 | 6

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | O&M UNIT COST, 2014 | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ) | TOTAL ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| Luanda | Maianga | | 2.82 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Luanda | Rangel | | 2.82 | 0.0 | 0 | 0 | 3.7 | 11 | 11 | 9.4 | 28 | 39 | 16.4 | 51 | 89 | 25.3 | 80 | 170 | 35.6 | 116 | 286 | 45.9 | 155 | 441 | 53.8 | 187 | 628 | 61.8 | 221 | 849 | 69.7 | 257 | 1,105 | 77.7 | 295 | 1,400 | 85.7 | 335 | 1,735 | 93.6 | 377 | 2,111 |
| Luanda | Samba | | 2.82 | 6.1 | 17 | 17 | 8.3 | 24 | 41 | 11.6 | 35 | 76 | 15.8 | 49 | 125 | 21.1 | 67 | 191 | 27.2 | 89 | 280 | 33.3 | 112 | 393 | 38.0 | 132 | 524 | 42.7 | 153 | 677 | 47.4 | 175 | 852 | 52.2 | 198 | 1,050 | 56.9 | 222 | 1,272 | 61.6 | 248 | 1,520 |
| Luanda | Sambizanga | | 2.82 | 0.0 | 0 | 0 | 3.7 | 11 | 11 | 9.4 | 28 | 39 | 16.4 | 51 | 89 | 25.3 | 80 | 170 | 35.6 | 116 | 286 | 45.9 | 155 | 441 | 53.8 | 187 | 628 | 61.8 | 221 | 849 | 69.7 | 257 | 1,105 | 77.7 | 295 | 1,400 | 85.7 | 335 | 1,735 | 93.6 | 377 | 2,111 |
| Luanda | Viana | | 2.82 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Lunda - Norte | Cambulo | | 2.93 | 7.4 | 22 | 22 | 7.6 | 23 | 45 | 8.0 | 25 | 69 | 8.4 | 27 | 96 | 8.9 | 29 | 126 | 9.5 | 32 | 158 | 10.2 | 36 | 194 | 10.6 | 38 | 232 | 11.1 | 41 | 273 | 11.6 | 44 | 317 | 12.1 | 48 | 365 | 12.5 | 51 | 416 | 13.0 | 54 | 470 |
| Lunda - Norte | Capenda-Camulemba | | 2.93 | 0.3 | 1 | 1 | 0.9 | 3 | 4 | 1.9 | 6 | 9 | 3.0 | 10 | 19 | 4.5 | 15 | 34 | 6.2 | 21 | 55 | 7.9 | 28 | 83 | 9.3 | 33 | 116 | 10.6 | 39 | 156 | 11.9 | 46 | 201 | 13.3 | 52 | 254 | 14.6 | 59 | 313 | 15.9 | 66 | 379 |
| Lunda - Norte | Caungula | | 2.93 | 0.0 | 0 | 0 | 0.3 | 1 | 1 | 0.8 | 3 | 3 | 1.4 | 5 | 8 | 2.2 | 7 | 15 | 3.1 | 10 | 26 | 3.9 | 14 | 39 | 4.6 | 17 | 56 | 5.3 | 20 | 76 | 6.0 | 23 | 99 | 6.7 | 26 | 125 | 7.4 | 30 | 155 | 8.0 | 34 | 188 |
| Lunda - Norte | Chitato | | 2.93 | 0.0 | 0 | 0 | 0.3 | 1 | 1 | 0.7 | 2 | 3 | 1.2 | 4 | 7 | 1.8 | 6 | 13 | 2.6 | 9 | 22 | 3.3 | 12 | 33 | 3.9 | 14 | 48 | 4.5 | 17 | 64 | 5.1 | 19 | 84 | 5.7 | 22 | 106 | 6.2 | 25 | 131 | 6.8 | 29 | 160 |
| Lunda - Norte | Cuango | | 2.93 | 7.6 | 22 | 22 | 11.9 | 36 | 58 | 18.3 | 57 | 115 | 26.3 | 84 | 199 | 36.5 | 120 | 320 | 48.2 | 164 | 483 | 59.9 | 210 | 693 | 69.0 | 249 | 942 | 78.1 | 290 | 1,231 | 87.1 | 333 | 1,565 | 96.2 | 379 | 1,944 | 105.3 | 427 | 2,371 | 114.4 | 478 | 2,848 |
| Lunda - Norte | Cuilo | | 2.93 | 0.0 | 0 | 0 | 0.2 | 1 | 1 | 0.6 | 2 | 3 | 1.0 | 3 | 6 | 1.6 | 5 | 11 | 2.2 | 8 | 19 | 2.9 | 10 | 29 | 3.4 | 12 | 41 | 3.9 | 14 | 55 | 4.3 | 17 | 72 | 4.8 | 19 | 91 | 5.3 | 22 | 112 | 5.8 | 24 | 137 |
| Lunda - Norte | Lubalo | | 2.93 | 0.0 | 0 | 0 | 0.4 | 1 | 1 | 1.0 | 3 | 5 | 1.8 | 6 | 10 | 2.8 | 9 | 20 | 4.0 | 13 | 33 | 5.1 | 18 | 51 | 6.0 | 22 | 73 | 6.9 | 26 | 98 | 7.8 | 30 | 128 | 8.7 | 34 | 162 | 9.5 | 39 | 201 | 10.4 | 44 | 244 |
| Lunda - Norte | Lucapa | | 2.93 | 9.1 | 27 | 27 | 10.0 | 30 | 57 | 11.2 | 35 | 92 | 12.8 | 41 | 132 | 14.7 | 49 | 181 | 17.0 | 58 | 239 | 19.3 | 67 | 306 | 21.0 | 76 | 382 | 22.8 | 85 | 467 | 24.6 | 94 | 560 | 26.3 | 104 | 664 | 28.1 | 114 | 778 | 29.8 | 125 | 902 |
| Lunda - Norte | Xá-muteba | | 2.93 | 0.0 | 0 | 0 | 1.2 | 4 | 4 | 2.9 | 9 | 13 | 5.1 | 16 | 29 | 7.9 | 26 | 55 | 11.1 | 38 | 93 | 14.4 | 50 | 143 | 16.9 | 61 | 204 | 19.3 | 72 | 276 | 21.8 | 83 | 359 | 24.3 | 96 | 455 | 26.8 | 109 | 564 | 29.3 | 122 | 686 |
| Lunda Sul | Cacolo | | 3.16 | 1.3 | 4 | 4 | 4.6 | 15 | 19 | 11.5 | 39 | 58 | 19.4 | 67 | 125 | 25.7 | 91 | 216 | 29.0 | 106 | 322 | 30.2 | 114 | 436 | 30.8 | 120 | 556 | 31.5 | 126 | 682 | 32.2 | 133 | 815 | 32.9 | 140 | 955 | 33.6 | 147 | 1,102 | 34.3 | 154 | 1,256 |
| Lunda Sul | Dala | | 3.16 | 0.5 | 2 | 2 | 4.1 | 13 | 15 | 11.5 | 38 | 53 | 20.0 | 69 | 122 | 26.7 | 95 | 217 | 30.2 | 111 | 328 | 31.5 | 119 | 447 | 32.2 | 125 | 572 | 32.9 | 132 | 703 | 33.7 | 139 | 842 | 34.4 | 146 | 988 | 35.1 | 154 | 1,142 | 35.9 | 162 | 1,303 |
| Lunda Sul | Muconda | | 3.16 | 2.4 | 8 | 8 | 7.6 | 25 | 32 | 18.5 | 62 | 95 | 31.0 | 107 | 202 | 40.9 | 145 | 347 | 46.1 | 169 | 516 | 47.9 | 181 | 697 | 49.0 | 190 | 887 | 50.1 | 200 | 1,088 | 51.2 | 211 | 1,299 | 52.3 | 222 | 1,520 | 53.3 | 233 | 1,754 | 54.4 | 245 | 1,999 |
| Lunda Sul | Saurimo | | 3.16 | 1.1 | 4 | 4 | 2.4 | 8 | 11 | 5.2 | 18 | 29 | 8.4 | 29 | 58 | 11.0 | 39 | 97 | 12.3 | 45 | 142 | 12.8 | 48 | 190 | 13.0 | 51 | 241 | 13.3 | 53 | 294 | 13.6 | 56 | 351 | 13.9 | 59 | 409 | 14.2 | 62 | 471 | 14.4 | 65 | 536 |
| Malanje | Caculama | | 2.90 | 0.0 | 0 | 0 | 0.7 | 2 | 2 | 1.6 | 5 | 7 | 2.9 | 9 | 16 | 4.4 | 14 | 31 | 6.2 | 21 | 52 | 8.0 | 28 | 79 | 9.4 | 34 | 113 | 10.8 | 40 | 153 | 12.2 | 46 | 199 | 13.6 | 53 | 252 | 15.0 | 60 | 312 | 16.4 | 68 | 380 |
| Malanje | Cacuso | | 2.90 | 8.3 | 24 | 24 | 9.6 | 29 | 53 | 11.4 | 35 | 88 | 13.7 | 44 | 132 | 16.7 | 54 | 186 | 20.1 | 68 | 254 | 23.5 | 81 | 335 | 26.1 | 93 | 428 | 28.7 | 106 | 534 | 31.3 | 119 | 652 | 34.0 | 132 | 785 | 36.6 | 147 | 932 | 39.2 | 162 | 1,094 |
| Malanje | Cagandala | | 2.90 | 0.0 | 0 | 0 | 0.9 | 3 | 3 | 2.1 | 7 | 9 | 3.8 | 12 | 21 | 5.8 | 19 | 40 | 8.2 | 27 | 67 | 10.5 | 36 | 104 | 12.3 | 44 | 148 | 14.2 | 52 | 200 | 16.0 | 61 | 261 | 17.8 | 69 | 330 | 19.6 | 79 | 409 | 21.5 | 89 | 498 |
| Malanje | Calandula | | 2.90 | 6.7 | 19 | 19 | 7.7 | 23 | 42 | 9.3 | 29 | 71 | 11.2 | 36 | 107 | 13.7 | 45 | 151 | 16.6 | 56 | 207 | 19.4 | 67 | 274 | 21.6 | 77 | 352 | 23.9 | 88 | 439 | 26.1 | 99 | 538 | 28.3 | 110 | 648 | 30.5 | 122 | 771 | 32.7 | 135 | 906 |
| Malanje | Cambundi-Catembo | | 2.90 | 0.5 | 2 | 2 | 1.2 | 4 | 5 | 2.2 | 7 | 12 | 3.5 | 11 | 23 | 5.1 | 17 | 40 | 7.0 | 24 | 64 | 8.9 | 31 | 94 | 10.3 | 37 | 131 | 11.8 | 43 | 175 | 13.2 | 50 | 225 | 14.7 | 57 | 282 | 16.1 | 65 | 347 | 17.6 | 73 | 419 |
| Malanje | Kahombo | | 2.90 | 0.0 | 0 | 0 | 0.7 | 2 | 2 | 1.7 | 5 | 7 | 2.9 | 9 | 16 | 4.5 | 15 | 31 | 6.4 | 21 | 53 | 8.2 | 28 | 81 | 9.6 | 34 | 115 | 11.1 | 41 | 156 | 12.5 | 47 | 203 | 13.9 | 54 | 257 | 15.3 | 62 | 319 | 16.7 | 69 | 388 |
| Malanje | Kiwaba-Ngozi | | 2.90 | 1.4 | 4 | 4 | 1.7 | 5 | 9 | 2.3 | 7 | 16 | 2.9 | 9 | 25 | 3.8 | 12 | 38 | 4.7 | 16 | 54 | 5.7 | 20 | 73 | 6.5 | 23 | 96 | 7.2 | 27 | 123 | 8.0 | 30 | 153 | 8.7 | 34 | 187 | 9.5 | 38 | 225 | 10.2 | 42 | 268 |
| Malanje | Kunda-Dia-Baze | | 2.90 | 0.0 | 0 | 0 | 0.4 | 1 | 1 | 1.1 | 3 | 5 | 2.0 | 6 | 11 | 3.0 | 10 | 21 | 4.3 | 14 | 35 | 5.5 | 19 | 54 | 6.5 | 23 | 77 | 7.4 | 27 | 105 | 8.4 | 32 | 136 | 9.3 | 36 | 173 | 10.3 | 41 | 214 | 11.2 | 47 | 261 |
| Malanje | Luquembo | | 2.90 | 0.0 | 0 | 0 | 0.9 | 3 | 3 | 2.3 | 7 | 10 | 4.1 | 13 | 23 | 6.3 | 20 | 43 | 8.8 | 30 | 73 | 11.4 | 39 | 112 | 13.3 | 48 | 160 | 15.3 | 56 | 216 | 17.3 | 65 | 281 | 19.2 | 75 | 356 | 21.2 | 85 | 441 | 23.2 | 96 | 537 |
| Malanje | Malanje | | 2.90 | 6.9 | 20 | 20 | 7.4 | 22 | 42 | 8.2 | 25 | 67 | 9.1 | 29 | 96 | 10.3 | 34 | 130 | 11.7 | 39 | 169 | 13.1 | 45 | 215 | 14.2 | 51 | 265 | 15.2 | 56 | 321 | 16.3 | 62 | 383 | 17.4 | 68 | 451 | 18.5 | 74 | 525 | 19.5 | 81 | 606 |
| Malanje | Marimba | | 2.90 | 0.0 | 0 | 0 | 0.3 | 1 | 1 | 0.9 | 3 | 4 | 1.5 | 5 | 9 | 2.4 | 8 | 16 | 3.3 | 11 | 27 | 4.3 | 15 | 42 | 5.0 | 18 | 60 | 5.8 | 21 | 81 | 6.5 | 25 | 106 | 7.2 | 28 | 134 | 8.0 | 32 | 166 | 8.7 | 36 | 203 |
| Malanje | Massango | | 2.90 | 0.0 | 0 | 0 | 0.5 | 2 | 2 | 1.3 | 4 | 6 | 2.4 | 7 | 13 | 3.6 | 12 | 25 | 5.1 | 17 | 42 | 6.6 | 23 | 65 | 7.7 | 28 | 93 | 8.9 | 33 | 126 | 10.0 | 38 | 164 | 11.2 | 44 | 207 | 12.3 | 50 | 257 | 13.5 | 56 | 312 |
| Malanje | Quela | | 2.90 | 0.2 | 0 | 0 | 0.9 | 3 | 3 | 2.0 | 6 | 9 | 3.4 | 11 | 20 | 5.1 | 17 | 37 | 7.1 | 24 | 61 | 9.1 | 32 | 92 | 10.7 | 38 | 130 | 12.2 | 45 | 175 | 13.8 | 52 | 228 | 15.4 | 60 | 287 | 16.9 | 68 | 355 | 18.5 | 76 | 432 |
| Malanje | Quirima | | 2.90 | 0.0 | 0 | 0 | 0.4 | 1 | 1 | 1.0 | 3 | 4 | 1.8 | 6 | 10 | 2.7 | 9 | 19 | 3.8 | 13 | 31 | 4.9 | 17 | 48 | 5.8 | 21 | 69 | 6.6 | 24 | 93 | 7.5 | 28 | 121 | 8.3 | 32 | 154 | 9.2 | 37 | 191 | 10.0 | 41 | 232 |
| Moxico | Alto Zambeze | | 2.99 | 0.4 | 1 | 1 | 1.3 | 4 | 5 | 2.7 | 8 | 14 | 4.4 | 14 | 28 | 6.5 | 22 | 50 | 9.0 | 31 | 81 | 11.5 | 41 | 122 | 13.4 | 49 | 171 | 15.3 | 58 | 229 | 17.2 | 67 | 296 | 19.2 | 77 | 373 | 21.1 | 87 | 460 | 23.0 | 98 | 558 |
| Moxico | Camanongue | | 2.99 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Kameia | | 2.99 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Léua | | 2.99 | 4.7 | 14 | 14 | 4.9 | 15 | 29 | 5.3 | 17 | 46 | 5.8 | 19 | 65 | 6.4 | 21 | 86 | 7.0 | 24 | 111 | 7.7 | 28 | 138 | 8.2 | 30 | 169 | 8.8 | 33 | 202 | 9.3 | 36 | 238 | 9.8 | 39 | 277 | 10.3 | 43 | 320 | 10.9 | 46 | 366 |
| Moxico | Luacano | | 2.99 | 5.8 | 17 | 17 | 5.9 | 18 | 35 | 6.1 | 19 | 55 | 6.3 | 21 | 75 | 6.6 | 22 | 98 | 7.0 | 24 | 122 | 7.3 | 26 | 148 | 7.6 | 28 | 176 | 7.9 | 30 | 205 | 8.1 | 32 | 237 | 8.4 | 34 | 271 | 8.7 | 36 | 307 | 8.9 | 38 | 345 |
| Moxico | Luau | | 2.99 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Moxico | Luchazes | | 2.99 | 1.6 | 5 | 5 | 2.3 | 7 | 12 | 3.3 | 11 | 22 | 4.7 | 15 | 38 | 6.3 | 21 | 59 | 8.2 | 29 | 87 | 10.2 | 36 | 124 | 11.7 | 43 | 166 | 13.2 | 50 | 216 | 14.6 | 57 | 273 | 16.1 | 65 | 338 | 17.6 | 73 | 411 | 19.1 | 81 | 492 |
| Moxico | Lumbala-Nguimbo | | 2.99 | 3.1 | 9 | 9 | 3.5 | 11 | 20 | 4.0 | 13 | 33 | 4.7 | 15 | 48 | 5.6 | 19 | 67 | 6.7 | 23 | 90 | 7.7 | 27 | 117 | 8.5 | 31 | 148 | 9.3 | 35 | 184 | 10.1 | 39 | 223 | 10.9 | 44 | 267 | 11.7 | 48 | 315 | 12.5 | 53 | 368 |
| Moxico | Moxico | | 2.99 | 10.3 | 31 | 31 | 10.7 | 33 | 64 | 11.4 | 36 | 100 | 12.2 | 40 | 139 | 13.3 | 45 | 184 | 14.5 | 50 | 234 | 15.7 | 56 | 290 | 16.7 | 61 | 351 | 17.6 | 67 | 418 | 18.6 | 72 | 490 | 19.5 | 78 | 569 | 20.5 | 85 | 653 | 21.4 | 91 | 744 |
| Namibe | Bibala | | 2.82 | 5.8 | 16 | 16 | 6.2 | 18 | 35 | 6.8 | 20 | 55 | 7.5 | 23 | 78 | 8.5 | 27 | 105 | 9.5 | 31 | 136 | 10.6 | 36 | 172 | 11.4 | 40 | 211 | 12.3 | 44 | 255 | 13.1 | 48 | 303 | 13.9 | 53 | 356 | 14.7 | 58 | 414 | 15.6 | 63 | 476 |
| Namibe | Camucuio | | 2.82 | 2.8 | 8 | 8 | 2.9 | 8 | 16 | 3.0 | 9 | 25 | 3.2 | 10 | 35 | 3.5 | 11 | 46 | 3.8 | 12 | 59 | 4.1 | 14 | 72 | 4.3 | 15 | 87 | 4.5 | 16 | 103 | 4.7 | 17 | 121 | 4.9 | 19 | 140 | 5.2 | 20 | 160 | 5.4 | 22 | 181 |
| Namibe | Namibe | | 2.82 | 7.1 | 20 | 20 | 7.4 | 21 | 41 | 7.7 | 23 | 65 | 8.2 | 25 | 90 | 8.8 | 28 | 118 | 9.4 | 31 | 148 | 10.1 | 34 | 183 | 10.6 | 37 | 219 | 11.2 | 40 | 259 | 11.7 | 43 | 302 | 12.2 | 46 | 349 | 12.7 | 50 | 398 | 13.2 | 53 | 451 |
| Namibe | Tômbua | | 2.82 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Namibe | Virei | | 2.82 | 1.4 | 4 | 4 | 1.9 | 6 | 10 | 2.7 | 8 | 18 | 3.7 | 11 | 29 | 5.0 | 16 | 45 | 6.4 | 21 | 66 | 7.9 | 27 | 93 | 9.0 | 31 | 124 | 10.1 | 36 | 160 | 11.2 | 41 | 201 | 12.4 | 47 | 248 | 13.5 | 53 | 301 | 14.6 | 59 | 360 |
| Uíge | Ambuila | | 3.12 | 0.0 | 0 | 0 | 0.2 | 1 | 1 | 0.7 | 2 | 3 | 1.3 | 4 | 8 | 1.8 | 6 | 14 | 2.0 | 7 | 21 | 2.1 | 8 | 29 | 2.1 | 8 | 37 | 2.2 | 9 | 46 | 2.2 | 9 | 55 | 2.3 | 10 | 65 | 2.3 | 10 | 75 | 2.4 | 11 | 85 |
| Uíge | Bembe | | 3.12 | 4.2 | 13 | 13 | 5.1 | 16 | 29 | 6.9 | 23 | 52 | 9.1 | 31 | 83 | 10.8 | 38 | 121 | 11.7 | 42 | 163 | 12.0 | 45 | 208 | 12.2 | 47 | 255 | 12.4 | 49 | 304 | 12.6 | 51 | 355 | 12.8 | 54 | 409 | 12.9 | 56 | 465 | 13.1 | 58 | 523 |
| Uíge | Bungo | | 3.12 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Uíge | Damba | | 3.12 | 3.3 | 10 | 10 | 6.6 | 21 | 31 | 13.5 | 45 | 76 | 21.4 | 73 | 149 | 27.6 | 97 | 246 | 30.9 | 112 | 358 | 32.1 | 120 | 478 | 32.8 | 126 | 603 | 33.4 | 132 | 736 | 34.1 | 139 | 875 | 34.8 | 146 | 1,021 | 35.5 | 153 | 1,174 | 36.2 | 161 | 1,335 |
| Uíge | Kangola | | 3.12 | 7.1 | 22 | 22 | 12.0 | 39 | 61 | 22.5 | 75 | 135 | 34.5 | 118 | 253 | 43.9 | 154 | 407 | 48.9 | 177 | 584 | 50.7 | 189 | 773 | 51.7 | 198 | 971 | 52.7 | 209 | 1,180 | 53.8 | 219 | 1,399 | 54.8 | 230 | 1,629 | 55.8 | 241 | 1,870 | 56.9 | 253 | 2,124 |
| Uíge | Maquela do Zombo | | 3.12 | 0.0 | 0 | 0 | 0.3 | 1 | 1 | 0.8 | 3 | 3 | 1.4 | 5 | 8 | 1.9 | 7 | 15 | 2.1 | 8 | 23 | 2.2 | 8 | 31 | 2.3 | 9 | 40 | 2.3 | 9 | 49 | 2.4 | 10 | 58 | 2.4 | 10 | 69 | 2.5 | 11 | 79 | 2.5 | 11 | 91 |
| Uíge | Milunga | | 3.12 | 2.0 | 6 | 6 | 2.3 | 7 | 14 | 3.0 | 10 | 24 | 3.8 | 13 | 37 | 4.4 | 16 | 52 | 4.8 | 17 | 70 | 4.9 | 18 | 88 | 5.0 | 19 | 107 | 5.0 | 20 | 127 | 5.1 | 21 | 147 | 5.2 | 22 | 169 | 5.2 | 23 | 192 | 5.3 | 24 | 215 |
| Uíge | Mucaba | | 3.12 | 2.5 | 8 | 8 | 6.8 | 22 | 30 | 15.7 | 52 | 82 | 26.0 | 89 | 170 | 34.1 | 120 | 290 | 38.3 | 139 | 429 | 39.8 | 148 | 577 | 40.7 | 156 | 734 | 41.6 | 165 | 898 | 42.5 | 173 | 1,071 | 43.4 | 182 | 1,253 | 44.3 | 191 | 1,445 | 45.2 | 201 | 1,646 |
| Uíge | Negage | | 3.12 | 1.0 | 3 | 3 | 2.3 | 7 | 11 | 5.1 | 17 | 28 | 8.3 | 28 | 56 | 10.8 | 38 | 94 | 12.2 | 44 | 138 | 12.6 | 47 | 185 | 12.9 | 50 | 234 | 13.2 | 52 | 287 | 13.4 | 55 | 341 | 13.7 | 58 | 399 | 14.0 | 61 | 459 | 14.3 | 64 | 523 |
| Uíge | Nova Esperança | | 3.12 | 0.0 | 0 | 0 | 1.2 | 4 | 4 | 3.7 | 12 | 16 | 6.5 | 22 | 38 | 8.7 | 31 | 69 | 9.9 | 36 | 104 | 10.3 | 38 | 143 | 10.6 | 41 | 183 | 10.8 | 43 | 226 | 11.0 | 45 | 271 | 11.3 | 47 | 318 | 11.5 | 50 | 368 | 11.8 | 52 | 421 |
| Uíge | Puri | | 3.12 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Uíge | Quimbele | | 3.12 | 0.0 | 0 | 0 | 2.4 | 8 | 8 | 7.5 | 25 | 33 | 13.3 | 45 | 78 | 17.9 | 63 | 141 | 20.4 | 74 | 215 | 21.2 | 79 | 294 | 21.7 | 83 | 377 | 22.2 | 88 | 465 | 22.7 | 93 | 558 | 23.2 | 97 | 655 | 23.7 | 103 | 758 | 24.2 | 108 | 865 |
| Uíge | Quitexe | | 3.12 | 2.0 | 6 | 6 | 3.4 | 11 | 17 | 6.3 | 21 | 38 | 9.7 | 33 | 71 | 12.4 | 44 | 115 | 13.8 | 50 | 165 | 14.3 | 53 | 218 | 14.6 | 56 | 274 | 14.9 | 59 | 333 | 15.2 | 62 | 395 | 15.5 | 65 | 460 | 15.8 | 68 | 528 | 16.1 | 72 | 600 |
| Uíge | Sanza Pombo | | 3.12 | 4.9 | 15 | 15 | 6.5 | 21 | 36 | 9.8 | 33 | 69 | 13.6 | 47 | 115 | 16.7 | 59 | 174 | 18.2 | 66 | 240 | 18.8 | 70 | 310 | 19.1 | 73 | 383 | 19.5 | 77 | 460 | 19.8 | 81 | 541 | 20.1 | 84 | 625 | 20.5 | 88 | 714 | 20.8 | 93 | 806 |
| Uíge | Songo | | 3.12 | 3.2 | 10 | 10 | 3.4 | 11 | 21 | 3.8 | 13 | 33 | 4.3 | 15 | 48 | 4.6 | 16 | 64 | 4.8 | 17 | 82 | 4.9 | 18 | 100 | 4.9 | 19 | 119 | 5.0 | 20 | 139 | 5.0 | 20 | 159 | 5.0 | 21 | 180 | 5.1 | 22 | 202 | 5.1 | 23 | 225 |
| Uíge | Uíge | | 3.12 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 |
| Zaire | Cuimba | | 3.00 | 0.0 | 0 | 0 | 0.5 | 2 | 2 | 1.3 | 4 | 6 | 2.3 | 7 | 13 | 3.5 | 12 | 25 | 4.9 | 17 | 42 | 6.3 | 23 | 64 | 7.4 | 27 | 92 | 8.5 | 32 | 124 | 9.6 | 38 | 161 | 10.7 | 43 | 204 | 11.8 | 49 | 253 | 12.9 | 55 | 308 |
| Zaire | Mbanza Congo | | 3.00 | 0.7 | 2 | 2 | 1.2 | 4 | 6 | 2.0 | 6 | 12 | 3.0 | 10 | 22 | 4.2 | 14 | 36 | 5.6 | 19 | 56 | 7.0 | 25 | 81 | 8.1 | 30 | 111 | 9.2 | 35 | 146 | 10.3 | 40 | 186 | 11.4 | 46 | 232 | 12.5 | 52 | 284 | 13.6 | 58 | 342 |
| Zaire | Nóqui | | 3.00 | 0.0 | 0 | 0 | 0.5 | 1 | 1 | 1.2 | 4 | 5 | 2.1 | 7 | 12 | 3.2 | 11 | 23 | 4.5 | 16 | 38 | 5.8 | 21 | 59 | 6.8 | 25 | 84 | 7.8 | 30 | 114 | 8.8 | 34 | 148 | 9.8 | 40 | 188 | 10.8 | 45 | 233 | 11.8 | 51 | 283 |
| Zaire | Nzeto | | 3.00 | 0.0 | 0 | 0 | 0.4 | 1 | 1 | 1.1 | 4 | 5 | 1.9 | 6 | 11 | 3.0 | 10 | 21 | 4.2 | 14 | 36 | 5.4 | 19 | 55 | 6.3 | 23 | 78 | 7.2 | 27 | 106 | 8.2 | 32 | 138 | 9.1 | 37 | 174 | 10.0 | 42 | 216 | 11.0 | 47 | 263 |
| Zaire | Soyo | | 3.00 | 4.0 | 12 | 12 | 4.8 | 15 | 27 | 5.9 | 19 | 46 | 7.4 | 24 | 70 | 9.2 | 31 | 101 | 11.3 | 39 | 140 | 13.4 | 48 | 188 | 15.0 | 55 | 243 | 16.6 | 63 | 307 | 18.3 | 72 | 378 | 19.9 | 80 | 458 | 21.5 | 89 | 548 | 23.2 | 99 | 647 |
| Zaire | Tomboco | | 3.00 | 0.0 | 0 | 0 | 0.5 | 1 | 1 | 1.1 | 4 | 5 | 2.0 | 7 | 12 | 3.1 | 10 | 22 | 4.4 | 15 | 37 | 5.6 | 20 | 58 | 6.6 | 24 | 82 | 7.6 | 29 | 111 | 8.6 | 34 | 144 | 9.5 | 38 | 183 | 10.5 | 44 | 226 | 11.5 | 49 | 276 |
| **TOTAL (USD)** | **152** | **372** | | **643.0** | **1,874** | **1,874** | **827.4** | **2,492** | **4,365** | **1,143.6** | **3,563** | **7,928** | **1,524.1** | **4,903** | **12,831** | **1,930.5** | **6,399** | **19,230** | **2,321.9** | **7,918** | **27,148** | **2,670.2** | **9,365** | **36,513** | **2,935.2** | **10,593** | **47,106** | **3,200.3** | **11,886** | **58,992** | **3,465.4** | **13,247** | **72,239** | **3,730.4** | **14,680** | **86,918** | **3,995.5** | **16,186** | **103,104** | **4,260.5** | **17,769** | **120,874** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

## ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026

| PROV. | MUN. | COMUNA | Unit UNIT COST, 2014 ) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS (x1000) | COST 2014 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2015 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2016 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2017 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2018 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2019 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2020 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2021 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2022 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2023 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2024 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2025 (X1000) | CUM. COST (X1000) | TOTAL ACCESS (x1000) | COST 2026 (X1000) | CUM. COST (X1000) |
| **PROJECTION BY PROVINCE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bengo | 8 | 21 | 3.02 | 25.1 | 76 | 76 | 28.9 | 90 | 165 | 34.5 | 111 | 276 | 41.6 | 137 | 413 | 50.6 | 172 | 585 | 61.0 | 213 | 798 | 71.4 | 257 | 1,056 | 79.4 | 295 | 1,350 | 87.5 | 334 | 1,685 | 95.5 | 376 | 2,061 | 103.5 | 420 | 2,480 | 111.6 | 466 | 2,946 | 119.6 | 514 | 3,461 |
| Benguela | 8 | 21 | 2.86 | 93.0 | 266 | 266 | 102.3 | 302 | 568 | 116.1 | 353 | 921 | 133.4 | 418 | 1,338 | 155.4 | 501 | 1,839 | 180.8 | 600 | 2,439 | 206.2 | 705 | 3,144 | 225.8 | 795 | 3,939 | 245.5 | 890 | 4,830 | 265.1 | 990 | 5,820 | 284.8 | 1,096 | 6,916 | 304.4 | 1,206 | 8,122 | 324.0 | 1,323 | 9,445 |
| Bié | 9 | 29 | 2.94 | 56.2 | 165 | 165 | 71.1 | 215 | 381 | 93.5 | 292 | 672 | 121.4 | 390 | 1,062 | 156.8 | 519 | 1,581 | 197.8 | 674 | 2,256 | 238.8 | 839 | 3,094 | 270.5 | 978 | 4,072 | 302.2 | 1,126 | 5,198 | 333.8 | 1,281 | 6,479 | 365.5 | 1,445 | 7,923 | 397.2 | 1,617 | 9,540 | 428.9 | 1,798 | 11,338 |
| Cabinda | 4 | 7 | 2.85 | 7.3 | 21 | 21 | 9.5 | 28 | 49 | 13.0 | 39 | 88 | 17.2 | 54 | 142 | 22.6 | 73 | 214 | 28.9 | 96 | 310 | 35.2 | 120 | 429 | 40.0 | 140 | 570 | 44.8 | 162 | 732 | 49.7 | 185 | 916 | 54.5 | 209 | 1,125 | 59.3 | 234 | 1,359 | 64.2 | 261 | 1,620 |
| Cunene | 6 | 14 | 2.83 | 27.7 | 78 | 78 | 37.5 | 109 | 188 | 52.2 | 157 | 345 | 70.7 | 219 | 563 | 94.0 | 300 | 863 | 121.1 | 397 | 1,261 | 148.1 | 501 | 1,761 | 169.0 | 589 | 2,350 | 189.9 | 681 | 3,031 | 210.8 | 779 | 3,810 | 231.7 | 882 | 4,692 | 252.6 | 990 | 5,682 | 273.5 | 1,104 | 6,786 |
| Huambo (2) | 11 | 25 | 2.98 | 83.8 | 250 | 250 | 114.2 | 351 | 600 | 178.0 | 563 | 1,163 | 250.9 | 817 | 1,981 | 308.6 | 1,036 | 3,016 | 339.0 | 1,172 | 4,188 | 349.6 | 1,245 | 5,433 | 355.9 | 1,305 | 6,738 | 362.3 | 1,368 | 8,107 | 368.6 | 1,434 | 9,541 | 374.9 | 1,502 | 11,043 | 381.3 | 1,574 | 12,617 | 387.6 | 1,648 | 14,264 |
| Huila | 14 | 45 | 2.82 | 157.5 | 445 | 445 | 178.3 | 518 | 963 | 209.4 | 627 | 1,591 | 248.3 | 766 | 2,357 | 297.6 | 946 | 3,303 | 354.7 | 1,161 | 4,464 | 411.8 | 1,388 | 5,852 | 455.9 | 1,583 | 7,435 | 500.0 | 1,788 | 9,224 | 544.1 | 2,005 | 11,228 | 588.2 | 2,232 | 13,460 | 632.3 | 2,471 | 15,932 | 676.4 | 2,723 | 18,655 |
| Kuando Kubang | 9 | 21 | 3.15 | 7.4 | 23 | 23 | 10.0 | 32 | 56 | 13.7 | 46 | 102 | 18.4 | 63 | 165 | 24.4 | 87 | 252 | 31.3 | 114 | 366 | 38.2 | 144 | 510 | 43.5 | 169 | 679 | 48.9 | 195 | 874 | 54.2 | 223 | 1,097 | 59.5 | 252 | 1,349 | 64.9 | 283 | 1,632 | 70.2 | 316 | 1,947 |
| Kuanza Norte | 9 | 18 | 2.99 | 14.5 | 43 | 43 | 17.2 | 53 | 96 | 21.4 | 68 | 164 | 26.6 | 87 | 251 | 33.2 | 111 | 362 | 40.8 | 141 | 503 | 48.4 | 173 | 676 | 54.3 | 199 | 876 | 60.2 | 228 | 1,103 | 66.1 | 258 | 1,361 | 72.0 | 289 | 1,650 | 77.9 | 322 | 1,972 | 83.7 | 357 | 2,328 |
| Kuanza Sul | 12 | 23 | 2.96 | 30.9 | 92 | 92 | 43.2 | 132 | 224 | 61.7 | 194 | 417 | 84.8 | 275 | 692 | 114.0 | 380 | 1,072 | 147.9 | 508 | 1,580 | 181.7 | 643 | 2,224 | 207.9 | 758 | 2,981 | 234.0 | 879 | 3,860 | 260.2 | 1,006 | 4,867 | 286.4 | 1,141 | 6,007 | 312.5 | 1,282 | 7,290 | 338.7 | 1,431 | 8,721 |
| Luanda | 5 | 6 | 2.82 | 8.1 | 23 | 23 | 23.0 | 67 | 90 | 45.3 | 136 | 226 | 73.2 | 226 | 451 | 108.5 | 345 | 796 | 149.4 | 489 | 1,285 | 190.3 | 641 | 1,926 | 221.9 | 770 | 2,696 | 253.4 | 906 | 3,602 | 285.0 | 1,050 | 4,652 | 316.6 | 1,201 | 5,853 | 348.2 | 1,360 | 7,213 | 379.8 | 1,528 | 8,741 |
| Lunda Norte | 9 | 16 | 2.93 | 24.5 | 72 | 72 | 32.8 | 99 | 171 | 45.4 | 141 | 312 | 61.1 | 196 | 507 | 80.9 | 267 | 774 | 103.9 | 353 | 1,127 | 126.9 | 444 | 1,571 | 144.7 | 521 | 2,093 | 162.5 | 603 | 2,696 | 180.3 | 689 | 3,385 | 198.0 | 780 | 4,165 | 215.8 | 875 | 5,040 | 233.6 | 976 | 6,016 |
| Lunda Sul (2) | 4 | 10 | 3.16 | 5.4 | 17 | 17 | 18.7 | 61 | 78 | 46.8 | 157 | 235 | 78.9 | 272 | 507 | 104.3 | 371 | 878 | 117.6 | 431 | 1,308 | 122.3 | 461 | 1,770 | 125.1 | 486 | 2,256 | 127.9 | 512 | 2,768 | 130.6 | 539 | 3,306 | 133.4 | 567 | 3,873 | 136.2 | 596 | 4,469 | 139.0 | 626 | 5,095 |
| Malanje | 14 | 37 | 2.90 | 24.0 | 70 | 70 | 33.4 | 100 | 169 | 47.5 | 146 | 316 | 65.1 | 206 | 522 | 87.4 | 286 | 808 | 113.3 | 381 | 1,189 | 139.1 | 482 | 1,671 | 159.1 | 568 | 2,239 | 179.1 | 658 | 2,897 | 199.1 | 754 | 3,650 | 219.0 | 854 | 4,504 | 239.0 | 960 | 5,464 | 259.0 | 1,071 | 6,536 |
| Moxico | 6 | 20 | 2.99 | 25.8 | 77 | 77 | 28.6 | 88 | 165 | 32.8 | 104 | 269 | 38.0 | 124 | 393 | 44.7 | 150 | 543 | 52.4 | 181 | 725 | 60.1 | 214 | 939 | 66.0 | 243 | 1,181 | 72.0 | 272 | 1,454 | 77.9 | 304 | 1,757 | 83.9 | 337 | 2,094 | 89.8 | 371 | 2,465 | 95.8 | 408 | 2,873 |
| Namibe | 5 | 9 | 2.82 | 17.1 | 48 | 48 | 18.4 | 53 | 102 | 20.3 | 61 | 163 | 22.7 | 70 | 232 | 25.7 | 82 | 314 | 29.2 | 95 | 409 | 32.6 | 110 | 520 | 35.3 | 123 | 642 | 38.0 | 136 | 778 | 40.7 | 150 | 928 | 43.4 | 165 | 1,093 | 46.1 | 180 | 1,273 | 48.8 | 196 | 1,469 |
| Uíge (2) | 13 | 31 | 3.12 | 30.1 | 94 | 94 | 52.5 | 169 | 263 | 99.5 | 329 | 592 | 153.2 | 523 | 1,114 | 195.7 | 688 | 1,802 | 218.1 | 789 | 2,591 | 225.9 | 842 | 3,433 | 230.6 | 885 | 4,319 | 235.2 | 930 | 5,249 | 239.9 | 977 | 6,226 | 244.5 | 1,026 | 7,252 | 249.2 | 1,077 | 8,329 | 253.9 | 1,130 | 9,459 |
| Zaire | 6 | 19 | 3.00 | 4.7 | 14 | 14 | 7.9 | 24 | 39 | 12.6 | 40 | 79 | 18.6 | 61 | 140 | 26.1 | 88 | 228 | 34.8 | 121 | 349 | 43.5 | 156 | 505 | 50.2 | 185 | 690 | 57.0 | 216 | 906 | 63.7 | 249 | 1,156 | 70.4 | 284 | 1,440 | 77.1 | 320 | 1,760 | 83.9 | 359 | 2,119 |
| **TOTAL (USD)** | **152** | **372** | | **643.0** | **1,874** | **1,874** | **827** | **2,492** | **4,365** | **1,144** | **3,563** | **7,928** | **1,524** | **4,903** | **12,831** | **1,931** | **6,399** | **19,230** | **2,322** | **7,918** | **27,148** | **2,670** | **9,365** | **36,513** | **2,935** | **10,593** | **47,106** | **3,200** | **11,886** | **58,992** | **3,465** | **13,247** | **72,239** | **3,730** | **14,680** | **86,918** | **3,995** | **16,186** | **103,104** | **4,261** | **17,769** | **120,874** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

**ANNEX B3: DETAILED OPERATION & MAINTENANCE COSTS, NRWSSP, 2014 - 2026**

| PROV. | MUN. | COMUNA | Usim UNIT COST, 2014 ) | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | 2021 | | | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TOTAL ACCESS *(x1000)* | COST 2014 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2015 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2016 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2017 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2018 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2019 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2020 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2021 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2022 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2023 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2024 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2025 *(X1000)* | CUM. COST *(X1000)* | TOTAL ACCESS *(x1000)* | COST 2026 *(X1000)* | CUM. COST *(X1000)* |
| **PILOT PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Huambo | 11 | 25 | 2.98 | 83.8 | 250 | 250 | 114.2 | 351 | 600 | 178.0 | 563 | 1,163 | 250.9 | 817 | 1,981 | 308.6 | 1,036 | 3,016 | 339.0 | 1,172 | 4,188 | 349.6 | 1,245 | 5,433 | 355.9 | 1,305 | 6,738 | 362.3 | 1,368 | 8,107 | 368.6 | 1,434 | 9,541 | 374.9 | 1,502 | 11,043 | 381.3 | 1,574 | 12,617 | 387.6 | 1,648 | 14,264 |
| Lunda Sul | 4 | 10 | 3.16 | 5.4 | 17 | 17 | 18.7 | 61 | 78 | 46.8 | 157 | 235 | 78.9 | 272 | 507 | 104.3 | 371 | 878 | 117.6 | 431 | 1,308 | 122.3 | 461 | 1,770 | 125.1 | 486 | 2,256 | 127.9 | 512 | 2,768 | 130.6 | 539 | 3,306 | 133.4 | 567 | 3,873 | 136.2 | 596 | 4,469 | 139.0 | 626 | 5,095 |
| Uige | 13 | 31 | 3.12 | 30.1 | 94 | 94 | 52.5 | 169 | 263 | 99.5 | 329 | 592 | 153.2 | 523 | 1,114 | 195.7 | 688 | 1,802 | 218.1 | 789 | 2,591 | 225.9 | 842 | 3,433 | 230.6 | 885 | 4,319 | 235.2 | 930 | 5,249 | 239.9 | 977 | 6,226 | 244.5 | 1,026 | 7,252 | 249.2 | 1,077 | 8,329 | 253.9 | 1,130 | 9,459 |
| **TOTAL (USD)** | **28** | **66** | | **119.2** | **361** | **361** | **185** | **580** | **941** | **324** | **1,049** | **1,990** | **483** | **1,612** | **3,602** | **609** | **2,094** | **5,696** | **675** | **2,392** | **8,088** | **698** | **2,548** | **10,636** | **712** | **2,677** | **13,313** | **725** | **2,810** | **16,123** | **739** | **2,950** | **19,073** | **753** | **3,095** | **22,168** | **767** | **3,246** | **25,414** | **780** | **3,404** | **28,818** |

*1. Os custos de capital estão sujeitos a 3% de inflação anual.*

## ANNEX B4: DETAILED SANITATION & HYGIENE PROMOTION COSTS

| DESCRIPTION | UNIT COST | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **NATIONAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Personnel expense** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Per diems | 180 | day | 0 | 0 | 50 | 9 | 50 | 10 | 25 | 5 | 25 | 5 | 60 | 13 | 45 | 10 | 30 | 7 | 25 | 6 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 390 | 83 |
| Domestic travel | 200 | day | 0 | 0 | 50 | 10 | 50 | 11 | 25 | 5 | 25 | 6 | 60 | 14 | 45 | 11 | 30 | 7 | 25 | 6 | 20 | 5 | 20 | 5 | 20 | 6 | 20 | 6 | 390 | 92 |
| Communications | 100 | month | 0 | 0 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 2 | 12 | 2 | 12 | 2 | 12 | 2 | 12 | 2 | 144 | 18 |
| **Consultant fees & expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | **0** | **0** |
| Communications consultant | 18,000 | Month | 0 | 0 | 6 | 111 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 6 | 111 |
| STLC consultant | 18,000 | Month | 0 | 0 | 12 | 222 | 12 | 229 | 6 | 118 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30 | 570 |
| San. marketing consultant | 18,000 | Month | 0 | 0 | 12 | 222 | 12 | 229 | 6 | 118 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 30 | 570 |
| International flights | 3,500 | Flight | 0 | 0 | 8 | 29 | 6 | 22 | 4 | 15 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 18 | 66 |
| Per diems | 180 | Day | 0 | 0 | 913 | 169 | 730 | 139 | 365 | 72 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2008 | 380 |
| Domestic travel | 500 | Flight | 0 | 0 | 20 | 10 | 15 | 8 | 10 | 5 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 45 | 24 |
| Communications | 50 | Month/pers | 0 | 0 | 30 | 2 | 24 | 1 | 12 | 1 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 66 | 3 |
| **Other expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | **0** | **0** |
| Workshops - national level | 3,500 | workshop | 0 | 0 | 2 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2 | 7 |
| Workshops - all provinces | 20,000 | workshop | 0 | 0 | 1 | 21 | 1 | 21 | 1 | 22 | 1 | 23 | 1 | 23 | 1 | 24 | 1 | 25 | 1 | 25 | 1 | 26 | 1 | 27 | 1 | 28 | 1 | 29 | 12 | 292 |
| Awareness campaign & matls | 10,000 | lump sum | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1 | 10 |
| Workshops - latrine design | 6,000 | workshop | 0 | 0 | 1 | 6 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 1 | 6 |
| **SUBTOTAL** | | | | **0** | | **831** | | **672** | | **363** | | **35** | | **51** | | **46** | | **40** | | **39** | | **38** | | **39** | | **40** | | **41** | | **2,233** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **COST FOR ONE PROVINCE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Personnel Expense** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Per diems | 180 | day | 0 | 0 | 120 | 22 | 80 | 15 | 60 | 12 | 60 | 12 | 30 | 6 | 30 | 6 | 30 | 7 | 30 | 7 | 30 | 7 | 30 | 7 | 30 | 7 | 30 | 8 | 560 | 117 |
| Domestic Travel (fuel + driver per diems) | 200 | day | 0 | 0 | 120 | 25 | 80 | 17 | 60 | 13 | 60 | 14 | 30 | 7 | 30 | 7 | 30 | 7 | 30 | 8 | 30 | 8 | 30 | 8 | 30 | 8 | 30 | 9 | 560 | 130 |
| Communications | 100 | month | 0 | 0 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 12 | 2 | 12 | 2 | 12 | 2 | 12 | 2 | 12 | 2 | 144 | 18 |
| **Other Expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | **0** | **0** |
| Workshops - Awareness / annual planning | 8,000 | workshop | 0 | 0 | 1 | 8 | 1 | 8 | 1 | 9 | 1 | 9 | 1 | 9 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 12 | 117 |
| Intensive training - ODF committees (1 wk) | 8,000 | lump sum | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 |
| Workshops - Training (periodic) | 2,000 | workshop | 0 | 0 | 0 | 0 | 4 | 8 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 13 |
| Awareness campaign & mtls | 7,500 | lump sum | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 |
| Provincial ODF committee manuals | 15 | manual | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 |
| Experience exchanges at provincial level | 5,000 | lump sum | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 1 | 6 | 0 | 0 | 1 | 6 | 0 | 0 | 1 | 7 | 0 | 0 | 1 | 7 | 0 | 0 | 5 | 31 |
| Vehicles (1 per province) | 37,000 | vehicle | 0 | 0 | 1 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 38 |
| Vehicle maintenance | 400 | month | 0 | 0 | 12 | 5 | 12 | 5 | 12 | 5 | 12 | 5 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 7 | 12 | 7 | 144 | 70 |
| Misc equipment | 4,000 | lump sum | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| **SUBTOTAL COST PER PROVINCE** | | | | **0** | | **120** | | **56** | | **50** | | **41** | | **35** | | **30** | | **37** | | **32** | | **40** | | **34** | | **42** | | **36** | | **554** |
| **ROLL-OUT TO PROVINCES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **No. Provinces added to NRWSSP** | | | | | **3** | | | | | | | | **15** | | | | | | | | | | | | | | **18** | |
| Year 1 provinces | | | | 0 | | 360 | | 167 | | 150 | | 124 | | 106 | | 91 | | 112 | | 97 | | 119 | | 102 | | 126 | | 109 | 0 | 1,663 |
| Year 5 provinces - 5 per year | | | | | | | | | | | | | | 2,025 | | 939 | | 845 | | 699 | | 595 | | 512 | | 631 | | 543 | 0 | 6,790 |
| **SUBTOTAL** | | | | **0** | | **360** | | **167** | | **150** | | **124** | | **2,131** | | **1,030** | | **957** | | **796** | | **714** | | **614** | | **757** | | **652** | | **8,452** |

## ANNEX B4: DETAILED SANITATION & HYGIENE PROMOTION COSTS

| DESCRIPTION | UNIT COST | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **COST FOR ONE MUNICIPALITY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Personnel Expense** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Personnel salaries & expenses | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Municipal Coordinator (salary for yr 1 & 2) | 800 | month | 0 | 0.0 | 12 | 9.9 | 12 | 10.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 24 | 20.1 |
| Facilitators (3 per municipality, for 4 years) | 400 | month | 0 | 0.0 | 36 | 14.8 | 36 | 15.3 | 36 | 15.7 | 36 | 16.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 144 | 62.1 |
| Field allowance + transp. (facilitators) | 300 | month | 0 | 0.0 | 36 | 11.1 | 36 | 11.5 | 36 | 11.8 | 36 | 12.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 144 | 46.5 |
| Per diems - other municipal staff | 180 | day | 0 | 0.0 | 144 | 26.7 | 144 | 27.5 | 144 | 28.3 | 144 | 29.2 | 60 | 12.5 | 60 | 12.9 | 60 | 13.3 | 60 | 13.7 | 60 | 14.1 | 60 | 14.5 | 60 | 14.9 | 60 | 15.4 | 1056 | 223.0 |
| Local Travel | 50 | day | 0 | 0.0 | 144 | 7.4 | 144 | 7.6 | 144 | 7.9 | 144 | 8.1 | 60 | 3.5 | 60 | 3.6 | 60 | 3.7 | 60 | 3.8 | 60 | 3.9 | 60 | 4.0 | 60 | 4.2 | 60 | 4.3 | 1056 | 62.0 |
| Communications | 75 | month | 0 | 0.0 | 12 | 0.9 | 12 | 1.0 | 12 | 1.0 | 12 | 1.0 | 12 | 1.0 | 12 | 1.1 | 12 | 1.1 | 12 | 1.1 | 12 | 1.2 | 12 | 1.2 | 12 | 1.2 | 12 | 1.3 | 144 | 13.2 |
| Equipment for Facilitators | 500 | facilitator | 0 | 0.0 | 3 | 1.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 1.5 |
| **Other Expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vehicles | 37,000 | vehicle | 0 | 0.0 | 1 | 38.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 38.1 |
| Vehicle maintenance | 300 | month | 0 | 0.0 | 12 | 3.7 | 12 | 3.8 | 12 | 3.9 | 12 | 4.1 | 12 | 4.2 | 12 | 4.3 | 12 | 4.4 | 12 | 4.6 | 12 | 4.7 | 12 | 4.8 | 12 | 5.0 | 12 | 5.1 | 144 | 52.6 |
| Intensive training - ODF committees (1 wk) | 12,000 | workshop | 0 | 0.0 | 1 | 12.4 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 12.4 |
| Workshops - training (periodic) | 4,000 | workshop | 0 | 0.0 | 0 | 0.0 | 4 | 17.0 | 2 | 8.7 | 1 | 4.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 7 | 30.2 |
| Workshops - training of comunas | 2,000 | workshop | 0 | 0.0 | 1 | 2.1 | 1 | 2.1 | 1 | 2.2 | 1 | 2.3 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | 4 | 8.6 |
| ODF committee manuals | 15 | manual | 0 | 0.0 | 50 | 0.8 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | 50 | 0.8 |
| Workshops - annual planning & eval. | 2,000 | workshop | 0 | 0.0 | 0 | 0.0 | 1 | 2.1 | 1 | 2.2 | 1 | 2.3 | 1 | 2.3 | 1 | 2.4 | 1 | 2.5 | 1 | 2.5 | 1 | 2.6 | 1 | 2.7 | 1 | 2.8 | 1 | 2.9 | 11 | 27.2 |
| Workshops - training for mun. facilitators | 3,500 | workshop | 0 | 0.0 | 1 | 3.6 | 1 | 3.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 7.3 |
| Facilitation materials | 100 | community | 0 | 0 | 20 | 2 | 20 | 2 | 20 | 2 | 20 | 2 | 20 | 2 | 20 | 2 | 20 | 2 | 20 | 3 | 20 | 3 | 20 | 3 | 20 | 3 | 20 | 3 | 240 | 29 |
| Workshops - latrine masons train. (3 d) | 10,000 | workshop | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 |
| Artisan manual & training materials | 15 | each | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| Mason start up assistance | 200 | mason | 0 | 0 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 2 |
| Demonstration centre | 20,000 | each | 0 | 0 | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 21 |
| Workshop - demo. centre training | 1,500 | workshop | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Training matls on demo. centre mgmt | 15 | each | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| Public latrine construction (1-2 per mun.) | 15,000 | each | 0 | 0 | 2 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 31 |
| Workshop - training for latrine operators | 1,500 | workshop | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Training matls on public latrine mgmt | 15 | each | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Experience exchanges at mun. level | 2,000 | lump sum | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 3 | 0 | 0 | 5 | 12 |
| Misc. equipment | 5,000 | lump sum | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| **TOTAL** | | | | **0** | | **208** | | **104** | | **86** | | **82** | | **28** | | **27** | | **30** | | **28** | | **32** | | **30** | | **34** | | **32** | | **720** |
| **ROLL-OUT TO MUNICIPALITIES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **No. Municipalities added to NRWSSP** | | | **0** | | **0** | | **12** | | **8** | | **8** | | **62** | | **46** | | **12** | | **4** | | **0** | | **0** | | **0** | | **0** | | | |
| Year 1 municipalities | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 |
| Year 2 municipalities | | | | | | | | 2,571 | | 1,284 | | 1,065 | | 1,013 | | 348 | | 329 | | 369 | | 349 | | 392 | | 370 | | 416 | | 8,506 |
| Year 3 municipalities | | | | | | | | | | 1,765 | | 882 | | 731 | | 696 | | 239 | | 226 | | 254 | | 240 | | 269 | | 254 | | 5,555 |
| Year 4 municipalities | | | | | | | | | | | | 1,818 | | 908 | | 753 | | 716 | | 246 | | 233 | | 261 | | 247 | | 277 | | 5,460 |
| Year 5 municipalities | | | | | | | | | | | | | | 14,513 | | 7,249 | | 6,010 | | 5,719 | | 1,966 | | 1,858 | | 2,085 | | 1,971 | | 41,372 |
| Year 6 municipalities | | | | | | | | | | | | | | | | 11,091 | | 5,540 | | 4,593 | | 4,371 | | 1,502 | | 1,420 | | 1,594 | | 30,110 |
| Year 7 municipalities | | | | | | | | | | | | | | | | | | 2,980 | | 1,489 | | 1,234 | | 1,174 | | 404 | | 382 | | 7,662 |
| Year 8 municipalities | | | | | | | | | | | | | | | | | | | | 1,023 | | 511 | | 424 | | 403 | | 139 | | 2,500 |
| **SUBTOTAL** | | | | **0** | | **0** | | **2,571** | | **3,049** | | **3,764** | | **17,165** | | **20,137** | | **15,815** | | **13,666** | | **8,917** | | **5,851** | | **5,199** | | **5,032** | | **101,166** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase 1 | | | | 0 | | 1,191 | | 3,409 | | 3,562 | | 3,923 | | | | | | | | | | | | | | | | | | 12,086 |
| Phase 2 | | | | | | | | | | | | | | 19,347 | | 21,212 | | 16,812 | | 14,500 | | | | | | | | | | 71,871 |
| Phase 3 | | | | | | | | | | | | | | | | | | | | | | 9,669 | | 6,504 | | 5,996 | | 5,725 | | 27,894 |
| **TOTAL (USD)** | | | | **0** | | **1,191** | | **3,409** | | **3,562** | | **3,923** | | **19,347** | | **21,212** | | **16,812** | | **14,500** | | **9,669** | | **6,504** | | **5,996** | | **5,725** | | **111,851** |

*1. Costs subject to 3% annual inflation.*

*2. PMU cost (personnel time, expenses) not included.*

*3. Year 1 in new & existing prov / municipalities will cost the same.*

## ANNEX B5: DETAILED CAPACITY BUILDING COSTS, NRWSSP (USD X1000)

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **NATIONAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Functional Capacity Building** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Planning & policy dev. | 35,000 | event | 0 | 0 | 0 | 0 | 1 | 37 | | 0 | | 0 | | 0 | | 0 | 0 | 0 | 1 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 81 |
| Monitoring | 35,000 | event | 0 | 0 | 1 | 36 | 1 | 37 | 1 | 38 | 1 | 39 | 3 | 122 | 3 | 125 | 3 | 129 | 1 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 571 |
| Communications | 35,000 | event | 0 | 0 | 0 | 0 | 1 | 37 | 1 | 38 | 1 | 39 | 0 | 0 | 3 | 125 | 3 | 129 | 1 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 414 |
| Standards preparation process | 45,000 | workshop | 0 | 0 | 1 | 46 | 1 | 48 | 0 | 0 | 1 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 145 |
| Internal guidelines/procedures prep. | 30,000 | workshop | 0 | 0 | 1 | 31 | 0 | 0 | 0 | 0 | 1 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 103 |
| Consultant support | 25,000 | consultancy | 0 | 0 | 1 | 26 | 1 | 27 | 1 | 27 | 1 | 28 | 1 | 29 | 1 | 30 | 1 | 31 | 1 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 229 |
| **Subtotal** | | | | **0** | | **139** | | **186** | | **104** | | **191** | | **151** | | **281** | | **289** | | **203** | | **0** | | **0** | | **0** | | **0** | | **1,543** |
| **NRWSSP Staff Training** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Technical training | 30,000 | event | 0 | 0 | 1 | 31 | 3 | 95 | 3 | 98 | 3 | 101 | 2 | 70 | 2 | 72 | 2 | 74 | 2 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 617 |
| Secondee (formal/ informal training) | 30,000 | person | 0 | 0 | 2 | 62 | 8 | 255 | 12 | 393 | 16 | 540 | 12 | 417 | 8 | 287 | 6 | 221 | 6 | 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 2,403 |
| **Subtotal** | | | | **0** | | **93** | | **350** | | **492** | | **642** | | **487** | | **358** | | **295** | | **304** | | **0** | | **0** | | **0** | | **0** | | **3,020** |
| **Coordination & Communications** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Annual Stakeholder Forum | 25,000 | event | 0 | 0 | 1 | 26 | 1 | 27 | 1 | 27 | 1 | 28 | 1 | 29 | 1 | 30 | 1 | 31 | 1 | 32 | 1 | 33 | 1 | 34 | 1 | 35 | 1 | 36 | 12 | 365 |
| Technical Review Team meetings | 8,500 | meetings | 0 | 0 | 3 | 26 | 4 | 36 | 4 | 37 | 4 | 38 | 4 | 39 | 4 | 41 | 4 | 42 | 4 | 43 | 1 | 11 | 1 | 11 | 1 | 12 | 1 | 12 | 35 | 349 |
| Support for Sector Review | 12,000 | lump | 0 | 0 | 0 | 0 | 1 | 13 | 1 | 13 | 1 | 14 | 1 | 14 | 1 | 14 | 1 | 15 | 1 | 15 | 1 | 16 | 1 | 16 | 1 | 17 | 1 | 17 | 11 | 163 |
| Consultant support | 25,000 | consultancy | 0 | 0 | 1 | 26 | 2 | 53 | 3 | 82 | 4 | 113 | 2 | 58 | 2 | 60 | 2 | 61 | 3 | 95 | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 580 |
| **Subtotal** | | | | **0** | | **78** | | **128** | | **160** | | **192** | | **140** | | **144** | | **149** | | **185** | | **92** | | **61** | | **63** | | **65** | | **1,458** |
| **Pilot Activities & Lessons Learned** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Learning agenda development | 80,000 | lump | 0 | 0 | 1 | 82 | 1 | 85 | 1 | 87 | 1 | 90 | 1 | 93 | 1 | 96 | 1 | 98 | 1 | 101 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 733 |
| Year 2 spot evaluation | 90,000 | lump | 0 | 0 | 0 | 0 | 1 | 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 95 |
| Consultant support | 25,000 | consultancy | 0 | 0 | 4 | 103 | 8 | 212 | 8 | 219 | 8 | 225 | 6 | 174 | 5 | 149 | 5 | 154 | 5 | 158 | 1 | 33 | 1 | 34 | 1 | 35 | 2 | 71 | 54 | 1,566 |
| Year 4 Programme evaluation | 250,000 | lump | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 281 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 281 |
| Year 8 Programme evaluation | 250,000 | lump | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 317 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 317 |
| Year 12 Programme evaluation | 250,000 | lump | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 356 | 1 | 356 |
| Publications & dissemination | 60,000 | lump | 0 | 0 | 1 | 62 | 2 | 127 | 3 | 197 | 3 | 203 | 3 | 209 | 2 | 143 | 2 | 148 | 3 | 228 | 1 | 78 | 1 | 81 | 1 | 83 | 1 | 86 | 23 | 1,643 |
| Study tours & official visits | 60,000 | lump | 0 | 0 | 1 | 62 | 2 | 127 | 2 | 131 | 2 | 135 | 2 | 139 | 2 | 143 | 2 | 148 | 2 | 152 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1,037 |
| **Subtotal** | | | | **0** | | **309** | | **647** | | **634** | | **934** | | **614** | | **531** | | **547** | | **956** | | **111** | | **114** | | **118** | | **513** | | **6,030** |
| **Training Institutions (3)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Training activities with IFAL | 22,000 | training | 0 | 0 | 0 | 0 | 10 | 233 | 12 | 288 | 16 | 396 | 16 | 408 | 16 | 420 | 16 | 433 | 16 | 446 | 12 | 344 | 12 | 355 | 12 | 365 | 12 | 376 | 150 | 4,066 |
| Training activities with Onga Zanga | 20,000 | training | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 306 | 20 | 450 | 32 | 742 | 40 | 955 | 40 | 984 | 40 | 1,013 | 30 | 783 | 30 | 806 | 30 | 831 | 30 | 855 | 306 | 7,726 |
| Training w/ univ. & tech. schools | 15,000 | training | 0 | 0 | 0 | 0 | 2 | 32 | 2 | 33 | 2 | 34 | 4 | 70 | 4 | 72 | 4 | 74 | 4 | 76 | 4 | 78 | 4 | 81 | 4 | 83 | 4 | 86 | 38 | 717 |
| Training w/ NGOs/private sector | 15,000 | training | 0 | 0 | 6 | 93 | 8 | 127 | 8 | 131 | 8 | 135 | 12 | 209 | 12 | 215 | 10 | 184 | 8 | 152 | 4 | 78 | 4 | 81 | 4 | 83 | 4 | 86 | 88 | 1,574 |
| Training with int'l organizations | 15,000 | training | 0 | 0 | 2 | 31 | 2 | 32 | 2 | 33 | 2 | 34 | 2 | 35 | 4 | 72 | 4 | 74 | 4 | 76 | 2 | 39 | 2 | 40 | 2 | 42 | 2 | 43 | 30 | 549 |
| In-house training activities | 8,000 | training | 0 | 0 | 2 | 16 | 2 | 17 | 4 | 35 | 4 | 36 | 8 | 74 | 8 | 76 | 6 | 59 | 6 | 61 | 6 | 63 | 6 | 65 | 6 | 66 | 6 | 68 | 64 | 637 |
| Consultant support | 25,000 | consultancy | | 0 | 4 | 103 | 4 | 106 | 4 | 109 | 4 | 113 | 2 | 58 | 2 | 60 | 2 | 61 | 2 | 63 | 2 | 65 | 2 | 67 | 2 | 69 | 0 | 0 | 30 | 875 |
| **Subtotal** | | | | **0** | | **243** | | **547** | | **935** | | **1,198** | | **1,595** | | **1,870** | | **1,869** | | **1,887** | | **1,451** | | **1,494** | | **1,539** | | **1,514** | | **16,144** |
| **Equipment & Facilities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS/GIS training | 8,000 | | 1 | 8 | 1 | 8 | 0 | 0 | 1 | 9 | 0 | 0 | 1 | 9 | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 44 |
| Other training by identified need | 10,000 | | 0 | 0 | 0 | 0 | 1 | 11 | 0 | 0 | 1 | 11 | 0 | 0 | 1 | 12 | 0 | 0 | 1 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 46 |
| **Subtotal** | | | | **8** | | **8** | | **11** | | **9** | | **11** | | **9** | | **12** | | **10** | | **13** | | **0** | | **0** | | **0** | | **0** | | **91** |
| **Informal Capacity Building** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Study tours (international) | 5,000 | each | 0 | 0 | 0 | 0 | 20 | 106 | 40 | 219 | 40 | 225 | 20 | 116 | 20 | 119 | 16 | 98 | 10 | 63 | 6 | 39 | 6 | 40 | 6 | 42 | 6 | 43 | 190 | 1,111 |
| Study tours (national) | 2,500 | each | 0 | 0 | 0 | 0 | 48 | 127 | 80 | 219 | 80 | 225 | 120 | 348 | 120 | 358 | 80 | 246 | 60 | 190 | 20 | 65 | 20 | 67 | 20 | 69 | 20 | 71 | 668 | 1,986 |
| Short-term staff exchanges | 2,500 | each | 0 | 0 | 0 | 0 | 10 | 27 | 20 | 55 | 30 | 84 | 60 | 174 | 40 | 119 | 40 | 123 | 20 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 645 |
| Short-term mentoring | 2,500 | each | 0 | 0 | 0 | 0 | 6 | 16 | 8 | 22 | 8 | 23 | 12 | 35 | 12 | 36 | 12 | 37 | 12 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 206 |
| Other, low-cost, by request | 500 | each | 0 | 0 | 0 | 0 | 40 | 21 | 60 | 33 | 80 | 45 | 120 | 70 | 100 | 60 | 80 | 49 | 80 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 560 | 328 |
| **Subtotal** | | | | **0** | | **0** | | **297** | | **546** | | **602** | | **742** | | **693** | | **553** | | **405** | | **104** | | **108** | | **111** | | **114** | | **4,276** |
| **SUBTOTAL - NATIONAL** | | | | **8** | | **870** | | **2,166** | | **2,879** | | **3,770** | | **3,739** | | **3,889** | | **3,713** | | **3,954** | | **1,758** | | **1,777** | | **1,831** | | **2,206** | | **32,561** |

## ANNEX B5: DETAILED CAPACITY BUILDING COSTS, NRWSSP (USD X1000)

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **PROVINCIAL LEVEL (3)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Functional Capacity Building** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Included at the national level | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **Coordination & Communications** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Consultant support | 20,000 | lump | 0 | 0 | 2 | 41 | 3 | 64 | 3 | 66 | 3 | 68 | 5 | 116 | 5 | 119 | 5 | 123 | 5 | 127 | 2 | 52 | 2 | 54 | 2 | 55 | | 0 | 37 | 884 |
| Provincial Oversight Group meetings | 8,000 | lump | 0 | 0 | 6 | 49 | 12 | 102 | 12 | 105 | 12 | 108 | 45 | 417 | 60 | 573 | 60 | 590 | 60 | 608 | 20 | 209 | 20 | 215 | 20 | 221 | 20 | 228 | 347 | 3,426 |
| **Subtotal** | | | | **0** | | **91** | | **166** | | **170** | | **176** | | **533** | | **693** | | **713** | | **735** | | **261** | | **269** | | **277** | | **228** | | **4,311** |
| **Equipment & Facilities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS/GIS training | 8,000 | lump | 1 | 8 | 1 | 8 | 0 | 0 | 1 | 9 | 0 | 0 | 1 | 9 | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 44 |
| Other training by identified need | 10,000 | lump | 0 | 0 | 2 | 21 | 2 | 21 | 2 | 22 | 2 | 23 | 6 | 70 | 10 | 119 | 10 | 123 | 10 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 525 |
| **Subtotal** | | | | **8** | | **29** | | **21** | | **31** | | **23** | | **79** | | **119** | | **133** | | **127** | | **0** | | **0** | | **0** | | **0** | | **569** |
| **Private Sector & NGOs (per plan)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Community mobilisation training | 400 | person | 0 | 0 | 300 | 124 | 300 | 127 | 300 | 131 | 450 | 203 | 900 | 417 | 900 | 430 | 450 | 221 | 225 | 114 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,825 | 1,767 |
| MoGeCA training / NRWSSP briefing | 450 | person | 0 | 0 | 300 | 139 | 300 | 143 | 300 | 148 | 450 | 228 | 900 | 470 | 900 | 484 | 450 | 249 | 225 | 128 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,825 | 1,988 |
| Mechanic & artisan training, technical | 600 | person | 0 | 0 | 180 | 111 | 180 | 115 | 180 | 118 | 270 | 182 | 540 | 376 | 540 | 387 | 270 | 199 | 135 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,295 | 1,590 |
| Contractor/NGO training, technical/admin | 600 | person | 0 | 0 | 180 | 111 | 180 | 115 | 180 | 118 | 270 | 182 | 540 | 376 | 540 | 387 | 270 | 199 | 135 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,295 | 1,590 |
| Supplier training | 400 | person | 0 | 0 | 120 | 49 | 120 | 51 | 120 | 52 | 180 | 81 | 360 | 167 | 360 | 172 | 180 | 89 | 90 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1,530 | 707 |
| **Subtotal** | | | | **0** | | **535** | | **551** | | **567** | | **876** | | **1,805** | | **1,859** | | **957** | | **493** | | **0** | | **0** | | **0** | | **0** | | **7,643** |
| **Informal Capacity Building** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Included at the national level | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **Service Providers (per plan)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Community mobilisation training | 400 | person | 0 | 0 | 75 | 31 | 75 | 32 | 75 | 33 | 200 | 90 | 250 | 116 | 250 | 119 | 200 | 98 | 100 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,225 | 570 |
| MoGeCA training / NRWSSP briefing | 450 | person | 0 | 0 | 75 | 35 | 75 | 36 | 75 | 37 | 200 | 101 | 250 | 130 | 250 | 134 | 200 | 111 | 100 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,225 | 641 |
| Relevant technical training | 600 | person | 0 | 0 | 75 | 46 | 75 | 48 | 75 | 49 | 200 | 135 | 250 | 174 | 250 | 179 | 200 | 148 | 100 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,225 | 855 |
| **Subtotal** | | | | **0** | | **112** | | **115** | | **119** | | **326** | | **420** | | **433** | | **357** | | **184** | | **0** | | **0** | | **0** | | **0** | | **2,066** |
| **SUBTOTAL - PROVINCIAL** | | | | **8** | | **766** | | **853** | | **887** | | **1,401** | | **2,837** | | **3,104** | | **2,160** | | **1,538** | | **261** | | **269** | | **277** | | **228** | | **14,589** |
| **MUNICIPAL LEVEL (3)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Active municipalities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active municipalities per year | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **Equipment & Facilities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS/GIS training | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **Informal Capacity Building** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Included at the national level | | | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **SUBTOTAL - MUNICIPAL** | | | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase 1 | | | | 16 | | 1,636 | | 3,019 | | 3,766 | | 5,171 | | | | | | | | | | | | | | | | | | 13,608 |
| Phase 2 | | | | | | | | | | | | | | 6,576 | | 6,993 | | 5,873 | | 5,492 | | | | | | | | | | 24,934 |
| Phase 3 | | | | | | | | | | | | | | | | | | | | | | 2,019 | | 2,046 | | 2,107 | | 2,434 | | 8,607 |
| **TOTAL (USDX1000)** | | | | **16** | | **1,636** | | **3,019** | | **3,766** | | **5,171** | | **6,576** | | **6,993** | | **5,873** | | **5,492** | | **2,019** | | **2,046** | | **2,107** | | **2,434** | | **47,150** |

*1. Costs subject to 3% annual inflation.*

*2. PMU cost (personnel time, expenses) not included.*

*3. Training activities for all levels are budgeted at national level, except for training provided to private sector (see "Provincial" section above). Final budgets to be based upon capacity building plans developed over the course of the Programme. Values presented in this table should therefore be considered estimates.*

## ANNEX B6: DETAILED MONITORING & REPORTING COSTS (USD x1000)

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **NATIONAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Personnel expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Per diems | 180 | day | | 0.0 | 45 | 8.3 | 35 | 6.7 | 25 | 4.9 | 10 | 2.0 | 60 | 12.5 | 60 | 12.9 | 30 | 6.6 | 10 | 2.3 | 10 | 2.3 | 10 | 2.4 | 10 | 2.5 | 10 | 2.6 | 315 | 66.1 |
| Domestic travel | 200 | day | | 0.0 | 45 | 9.3 | 35 | 7.4 | 25 | 5.5 | 10 | 2.3 | 60 | 13.9 | 60 | 14.3 | 30 | 7.4 | 10 | 2.5 | 10 | 2.6 | 10 | 2.7 | 10 | 2.8 | 10 | 2.9 | 315 | 73.5 |
| Communications | 100 | month | | 0.0 | 12 | 1.2 | 12 | 1.3 | 12 | 1.3 | 12 | 1.4 | 12 | 1.4 | 12 | 1.4 | 12 | 1.5 | 12 | 1.5 | 12 | 1.6 | 12 | 1.6 | 12 | 1.7 | 12 | 1.7 | 144 | 17.5 |
| **Consultant fees & expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M&R consultant (30 months) | 18,000 | Month | | 0.0 | 12 | 222.5 | 12 | 229.2 | 6 | 118.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 30 | 569.6 |
| International flights | 3,500 | Flight | | 0.0 | 3 | 10.8 | 3 | 11.1 | 2 | 7.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 8 | 29.6 |
| Per diems | 180 | Day | | 0.0 | 365 | 67.7 | 365 | 69.7 | 183 | 36.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 913 | 173.4 |
| Domestic travel | 500 | Flight | | 0.0 | 9 | 4.6 | 15 | 8.0 | 6 | 3.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 30 | 15.9 |
| Communications | 50 | Month/pers | | 0.0 | 1 | 0.1 | 1 | 0.1 | 1 | 0.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 0.2 |
| **Other expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sector working group meetings | 3,500 | workshop | | 0.0 | 4 | 14.4 | 1 | 3.7 | 1 | 3.8 | 1 | 3.9 | 1 | 4.1 | 1 | 4.2 | 1 | 4.3 | 1 | 4.4 | 1 | 4.6 | 1 | 4.7 | 1 | 4.8 | 1 | 5.0 | 15 | 62.0 |
| Workshops - national level | 3,500 | workshop | | 0.0 | 2 | 7.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 7.2 |
| Workshops - indicators | 10,000 | workshop | | 0.0 | 1 | 10.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 10.3 |
| Sector review planning wkshp | 10,000 | workshop | | 0.0 | 0 | 0.0 | 1 | 10.6 | 1 | 10.9 | 1 | 11.3 | 1 | 11.6 | 1 | 11.9 | 1 | 12.3 | 1 | 12.7 | 1 | 13.0 | 1 | 13.4 | 1 | 13.8 | 1 | 14.3 | 11 | 135.9 |
| Annual report (prod./dissem.) | 7,500 | annual | | 0.0 | 0 | 0.0 | 1 | 8.0 | 1 | 8.2 | 1 | 8.4 | 1 | 8.7 | 1 | 9.0 | 1 | 9.2 | 1 | 9.5 | 1 | 9.8 | 1 | 10.1 | 1 | 10.4 | 1 | 10.7 | 11 | 101.9 |
| Tools & manuals | 2,500 | lump sum | | 0.0 | 1 | 2.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 2.6 |
| Equipment & software | 10,000 | lump sum | | 0.0 | 1 | 10.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 10.3 |
| Mobile-phone based mapping | 10,000 | lump sum | | 0.0 | 1 | 10.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 10.3 |
| Workshops - training (2 days) | 6,500 | workshop | | 0.0 | 1 | 6.7 | 1 | 6.9 | 0 | 0.0 | 0 | 0.0 | 1 | 7.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 21.1 |
| **SUBTOTAL - NATIONAL LEVEL** | | | | **0.0** | | **386.3** | | **362.6** | | **199.6** | | **29.3** | | **59.7** | | **53.7** | | **41.3** | | **32.9** | | **33.9** | | **34.9** | | **36.0** | | **37.1** | | **1,307.4** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cost for one (1) province** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Personnel salaries & expenses | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coordinator salary Y1 & Y2 | 1,200 | month | | 0.0 | 12 | 14.8 | 12 | 15.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 24 | 30.1 |
| Per diems | 180 | day | | 0.0 | 60 | 11.1 | 60 | 11.5 | 60 | 11.8 | 40 | 8.1 | 10 | 2.1 | 10 | 2.1 | 10 | 2.2 | 10 | 2.3 | 10 | 2.3 | 10 | 2.4 | 10 | 2.5 | 10 | 2.6 | 300 | 61.0 |
| Domestic travel, fuel, driver | 200 | day | | 0.0 | 60 | 12.4 | 60 | 12.7 | 60 | 13.1 | 40 | 9.0 | 10 | 2.3 | 10 | 2.4 | 10 | 2.5 | 10 | 2.5 | 10 | 2.6 | 10 | 2.7 | 10 | 2.8 | 10 | 2.9 | 300 | 67.8 |
| Communications | 100 | month | | 0.0 | 12 | 1.2 | 12 | 1.3 | 12 | 1.3 | 12 | 1.4 | 12 | 1.4 | 12 | 1.4 | 12 | 1.5 | 12 | 1.5 | 12 | 1.6 | 12 | 1.6 | 12 | 1.7 | 12 | 1.7 | 144 | 17.5 |
| **Other expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Workshops - provincial level | 3,500 | workshop | | 0.0 | 1 | 3.6 | 1 | 3.7 | 1 | 3.8 | 1 | 3.9 | 1 | 4.1 | 1 | 4.2 | 1 | 4.3 | 1 | 4.4 | 1 | 4.6 | 1 | 4.7 | 1 | 4.8 | 1 | 5.0 | 12 | 51.2 |
| Annual report (prod./dissem.) | 3,000 | annual | | 0.0 | 0 | 0.0 | 1 | 3.2 | 1 | 3.3 | 1 | 3.4 | 1 | 3.5 | 1 | 3.6 | 1 | 3.7 | 1 | 3.8 | 1 | 3.9 | 1 | 4.0 | 1 | 4.2 | 1 | 4.3 | 11 | 40.8 |
| Tools & manuals | 1,000 | lump sum | | 0.0 | 1 | 1.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 1.0 |
| Equipment & software | 5,000 | lump sum | | 0.0 | 1 | 5.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 5.2 |
| Workshops - training (2 days) | 5,000 | workshop | | 0.0 | 1 | 5.2 | 1 | 5.3 | 1 | 5.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 15.9 |
| Workshops - training (periodic) | 2,000 | workshop | | 0.0 | 0 | 0.0 | 2 | 4.2 | 2 | 4.4 | 2 | 4.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 6 | 13.1 |
| Mobile-phone based mapping | 7,500 | lump sum | | 0.0 | 1 | 7.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 7.7 |
| Baseline survey (ICT-based) | 35,000 | lump sum | | 0.0 | 1 | 36.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 36.1 |
| Vehicles (1 per province) | 37,000 | vehicle | | 0.0 | 1 | 38.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 38.1 |
| Vehicle maintenance | 300 | month | | 0.0 | 12 | 3.7 | 12 | 3.8 | 12 | 3.9 | 12 | 4.1 | 12 | 4.2 | 12 | 4.3 | 12 | 4.4 | 12 | 4.6 | 12 | 4.7 | 12 | 4.8 | 12 | 5.0 | 12 | 5.1 | 144 | 52.6 |
| **Subtotal cost per province** | | | | **0.0** | | **140.1** | | **61.0** | | **47.1** | | **34.3** | | **17.5** | | **18.0** | | **18.6** | | **19.1** | | **19.7** | | **20.3** | | **20.9** | | **21.5** | | **438.2** |
| **Roll-out to provinces** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. Participating Provinces | | | | | 3 | | | | | | | | 15 | | | | | | | | | | | | | | | |
| Year 1 provinces | | | | 0.0 | | 420.2 | | 183.0 | | 141.3 | | 103.0 | | 52.5 | | 54.1 | | 55.7 | | 57.4 | | 59.1 | | 60.9 | | 62.7 | | 64.6 | 0 | 1,314.5 |
| Year 5 provinces | | | | | | | | | | | | | | 2,364.9 | | 1,029.9 | | 795.1 | | 579.5 | | 295.5 | | 304.4 | | 313.5 | | 322.9 | 0 | 6,005.8 |
| **Subtotal - provincial level** | | | | **0.0** | | **420.2** | | **183.0** | | **141.3** | | **103.0** | | **2,417.4** | | **1,084.0** | | **850.8** | | **636.9** | | **354.6** | | **365.3** | | **376.2** | | **387.5** | | **7,320.3** |

## ANNEX B6: DETAILED MONITORING & REPORTING COSTS (USD x1000)

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cost for one (1) municipality** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Personnel salaries & expenses | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coordinator salary Y1 & Y2 | 800 | month | | 0.0 | 12 | 9.9 | 12 | 10.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 24 | 20.1 |
| Per diems | 180 | day | | 0.0 | 40 | 7.4 | 80 | 15.3 | 60 | 11.8 | 60 | 12.2 | 40 | 8.3 | 40 | 8.6 | 40 | 8.9 | 40 | 9.1 | 40 | 9.4 | 40 | 9.7 | 40 | 10.0 | 40 | 10.3 | 560 | 120.9 |
| Local travel | 50 | day | | 0.0 | 40 | 2.1 | 80 | 4.2 | 60 | 3.3 | 60 | 3.4 | 40 | 2.3 | 40 | 2.4 | 40 | 2.5 | 40 | 2.5 | 40 | 2.6 | 40 | 2.7 | 40 | 2.8 | 40 | 2.9 | 560 | 33.6 |
| Communications | 50 | month | | 0.0 | 12 | 0.6 | 12 | 0.6 | 12 | 0.7 | 12 | 0.7 | 12 | 0.7 | 12 | 0.7 | 12 | 0.7 | 12 | 0.8 | 12 | 0.8 | 12 | 0.8 | 12 | 0.8 | 12 | 0.9 | 144 | 8.8 |
| **Other expenses** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Workshops - municipal level | 2,000 | workshop | | 0.0 | 2 | 4.1 | 1 | 2.1 | 1 | 2.2 | 1 | 2.3 | 1 | 2.3 | 1 | 2.4 | 1 | 2.5 | 1 | 2.5 | 1 | 2.6 | 1 | 2.7 | 1 | 2.8 | 1 | 2.9 | 13 | 31.3 |
| Equipment | 5,000 | lump sum | | 0.0 | 1 | 5.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 5.2 |
| Reports & forms | 1,000 | annual | | 0.0 | 0 | 0.0 | 1 | 1.1 | 1 | 1.1 | 1 | 1.1 | 1 | 1.2 | 1 | 1.2 | 1 | 1.2 | 1 | 1.3 | 1 | 1.3 | 1 | 1.3 | 1 | 1.4 | 1 | 1.4 | 11 | 13.6 |
| Workshops - training (2 days) | 5,000 | workshop | | 0.0 | 0 | 0.0 | 2 | 10.6 | 1 | 5.5 | 1 | 5.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 21.7 |
| Workshops - training (periodic) | 2,000 | workshop | | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 2.2 | 1 | 2.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 4.4 |
| Training materials | 500 | annual | | 0.0 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 2.2 |
| Workshops - training of comunas | 2,000 | workshop | | 0.0 | 1 | 2.1 | 1 | 2.1 | 1 | 2.2 | 1 | 2.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 8.6 |
| Tools & manuals | 1,000 | lump sum | | 0.0 | 1 | 1.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 1.0 |
| Vehicles (1 per municipality) | 37,000 | vehicle | | 0.0 | 1 | 38.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 38.1 |
| Vehicle maintenance | 300 | month | | 0.0 | 12 | 3.7 | 12 | 3.8 | 12 | 3.9 | 12 | 4.1 | 12 | 4.2 | 12 | 4.3 | 12 | 4.4 | 12 | 4.6 | 12 | 4.7 | 12 | 4.8 | 12 | 5.0 | 12 | 5.1 | 144 | 52.6 |
| **Total** | | | | **0.0** | | **74.7** | | **50.6** | | **33.3** | | **34.3** | | **19.0** | | **19.6** | | **20.2** | | **20.8** | | **21.4** | | **22.0** | | **22.7** | | **23.4** | | **362.0** |
| **Roll-out to municipalities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **No. Municipalities** | | | **0** | | **0** | | **12** | | **8** | | **8** | | **62** | | **46** | | **12** | | **4** | | **0** | | **0** | | **0** | | **0** | | | |
| Year 1 municipalities | | | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | 0 | 0.0 |
| Year 2 municipalities | | | | | | | | 923.0 | | 625.5 | | 411.9 | | 424.3 | | 235.0 | | 242.0 | | 249.3 | | 256.8 | | 264.5 | | 272.4 | | 280.6 | 0 | 4,185.3 |
| Year 3 municipalities | | | | | | | | | | 633.8 | | 429.5 | | 282.9 | | 291.3 | | 161.4 | | 166.2 | | 171.2 | | 176.3 | | 181.6 | | 187.1 | 0 | 2,681.2 |
| Year 4 municipalities | | | | | | | | | | | | 652.8 | | 442.4 | | 291.3 | | 300.1 | | 166.2 | | 171.2 | | 176.3 | | 181.6 | | 187.1 | 0 | 2,569.0 |
| Year 5 municipalities | | | | | | | | | | | | | | 5,210.9 | | 3,531.3 | | 2,325.7 | | 2,395.5 | | 1,326.7 | | 1,366.5 | | 1,407.5 | | 1,449.7 | 0 | 19,013.8 |
| Year 6 municipalities | | | | | | | | | | | | | | | | 3,982.2 | | 2,698.6 | | 1,777.3 | | 1,830.6 | | 1,013.9 | | 1,044.3 | | 1,075.6 | 0 | 13,422.3 |
| Year 7 municipalities | | | | | | | | | | | | | | | | | | 1,070.0 | | 725.1 | | 477.5 | | 491.9 | | 272.4 | | 280.6 | 0 | 3,317.5 |
| Year 8 municipalities | | | | | | | | | | | | | | | | | | | | 367.4 | | 249.0 | | 164.0 | | 168.9 | | 93.5 | 0 | 1,042.7 |
| **Subtotal - municpal level** | | | | **0.0** | | **0.0** | | **923.0** | | **1,259.3** | | **1,494.2** | | **6,360.5** | | **8,331.1** | | **6,797.8** | | **5,846.9** | | **4,482.9** | | **3,653.3** | | **3,528.7** | | **3,554.1** | | **46,231.8** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase 1 | | | | 0.0 | | 806.5 | | 1,468.6 | | 1,600.2 | | 1,626.5 | | | | | | | | | | | | | | | | | | 5,501.7 |
| Phase 2 | | | | | | | | | | | | | | 8,837.6 | | 9,468.8 | | 7,689.9 | | 6,516.8 | | | | | | | | | | 32,513.1 |
| Phase 3 | | | | | | | | | | | | | | | | | | | | | | 4,871.5 | | 4,053.5 | | 3,940.9 | | 3,978.7 | | 16,844.7 |
| **TOTAL (USD)** | | | | **0.0** | | **806.5** | | **1,468.6** | | **1,600.2** | | **1,626.5** | | **8,837.6** | | **9,468.8** | | **7,689.9** | | **6,516.8** | | **4,871.5** | | **4,053.5** | | **3,940.9** | | **3,978.7** | | **54,859.5** |

*1. Costs subject to 3% annual inflation.*

*2. PMU cost (personnel time, expenses) not included.*

*3. Year 1 in new & existing prov / municipalities will cost the same.*

**ANNEX B7: DETAILED PROGRAM MANAGEMENT COSTS, NRWSSP (USD X1000)**

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **NATIONAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Staff salaries** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Programme Manager | 105,000 | per. year | 0 | 0 | 1 | 108 | 1 | 111 | 1 | 115 | 1 | 118 | 1 | 122 | 1 | 125 | 1 | 129 | 1 | 133 | 1 | 137 | 1 | 141 | 1 | 145 | 1 | 150 | 12 | 1,535 |
| Deputy Programme Manager | 87,000 | per. year | 0 | 0 | 1 | 90 | 1 | 92 | 1 | 95 | 1 | 98 | 2 | 202 | 2 | 208 | 2 | 214 | 2 | 220 | 1 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1,276 |
| Programme administrator | 87,000 | per. year | 0 | 0 | 1 | 90 | 1 | 92 | 1 | 95 | 1 | 98 | 1 | 101 | 1 | 104 | 1 | 107 | 1 | 110 | 1 | 114 | 1 | 117 | 1 | 120 | 1 | 124 | 12 | 1,272 |
| Senior Procurement Analyst | 87,000 | per. year | 0 | 0 | 1 | 90 | 1 | 92 | 1 | 95 | 1 | 98 | 2 | 202 | 2 | 208 | 2 | 214 | 2 | 220 | 2 | 227 | 2 | 234 | 1 | 120 | 1 | 124 | 18 | 1,924 |
| Programme Accountant | 65,000 | per. year | 0 | 0 | 1 | 60 | 1 | 69 | 1 | 71 | 1 | 73 | 2 | 151 | 2 | 155 | 2 | 160 | 2 | 165 | 2 | 170 | 2 | 175 | 1 | 90 | 1 | 93 | 18 | 1,431 |
| Administrative Assistant | 50,000 | per. year | 0 | 0 | 2 | 93 | 2 | 106 | 2 | 109 | 2 | 113 | 4 | 232 | 4 | 239 | 4 | 246 | 4 | 253 | 3 | 196 | 2 | 134 | 2 | 138 | 2 | 143 | 33 | 2,002 |
| Senior WASH Technical Advisor | 87,000 | per. year | 0 | 0 | 1 | 81 | 1 | 92 | 1 | 95 | 1 | 98 | 1 | 101 | 1 | 104 | 1 | 107 | 1 | 110 | 1 | 114 | 1 | 117 | 1 | 120 | 1 | 124 | 12 | 1,263 |
| Senior Training Advisor | 70,000 | per. year | 0 | 0 | 1 | 65 | 1 | 74 | 1 | 76 | 1 | 79 | 1 | 81 | 1 | 84 | 1 | 86 | 1 | 89 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 634 |
| M&R specialist | 75,000 | per. year | 0 | 0 | 1 | 70 | 1 | 80 | 1 | 82 | 1 | 84 | 1 | 87 | 1 | 90 | 1 | 92 | 1 | 95 | 1 | 98 | 1 | 101 | 1 | 104 | 1 | 107 | 12 | 1,089 |
| IT Specialist | 70,000 | per. year | 0 | 0 | 1 | 65 | 1 | 74 | 1 | 76 | 1 | 79 | 1 | 81 | 1 | 84 | 1 | 86 | 1 | 89 | 1 | 91 | 1 | 94 | 1 | 97 | 1 | 100 | 12 | 1,016 |
| Communications Specialist | 65,000 | per. year | 0 | 0 | 1 | 60 | 1 | 69 | 1 | 71 | 1 | 73 | 1 | 75 | 1 | 78 | 1 | 80 | 1 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 589 |
| Driver / office aide | 24,000 | per. year | 0 | 0 | 2 | 44 | 2 | 51 | 2 | 52 | 2 | 54 | 2 | 56 | 2 | 57 | 2 | 59 | 2 | 61 | 2 | 63 | 2 | 65 | 2 | 66 | 2 | 68 | 24 | 697 |
| Seconded Staff | 40,000 | per. year | 0 | 0 | 1 | 31 | 1 | 42 | 1 | 44 | 1 | 45 | 1 | 46 | 1 | 48 | 1 | 49 | 1 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 356 |
| **Subtotal** | | | | **0** | | **946** | | **1,046** | | **1,077** | | **1,110** | | **1,536** | | **1,582** | | **1,630** | | **1,678** | | **1,265** | | **1,177** | | **1,002** | | **1,032** | | **15,082** |
| **Other staff costs** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Staff benefits (60% of salary) | 60% | global | 60% | 0 | 60% | 567 | 60% | 628 | 60% | 646 | 60% | 666 | 60% | 922 | 60% | 949 | 60% | 978 | 60% | 1,007 | 60% | 759 | 60% | 706 | 60% | 601 | 60% | 619 | | 9,049 |
| Flights (international) | 3,500 | each | 0 | 0 | 12 | 43 | 10 | 37 | 10 | 38 | 12 | 47 | 12 | 49 | 12 | 50 | 12 | 52 | 12 | 53 | 2 | 9 | 2 | 9 | 2 | 10 | 2 | 10 | 100 | 408 |
| Per diems (international) | 250 | day | 0 | 0 | 36 | 9 | 30 | 8 | 30 | 8 | 36 | 10 | 36 | 10 | 36 | 11 | 36 | 11 | 36 | 11 | 6 | 2 | 6 | 2 | 6 | 2 | 6 | 2 | 300 | 87 |
| Flights (national) | 500 | each | 0 | 0 | 112 | 58 | 120 | 64 | 120 | 66 | 120 | 68 | 150 | 87 | 150 | 90 | 150 | 92 | 150 | 95 | 30 | 20 | 30 | 20 | 30 | 21 | 30 | 21 | 1,192 | 700 |
| Per diems (national) | 125 | day | 0 | 0 | 800 | 103 | 1,000 | 133 | 1,100 | 150 | 1,100 | 155 | 1,500 | 217 | 1,600 | 239 | 1,600 | 246 | 1,600 | 253 | 400 | 65 | 400 | 67 | 400 | 69 | 400 | 71 | 11,900 | 1,769 |
| Staff incentives | 6,000 | global | 0 | 0 | 1 | 6 | 1 | 6 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 8 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 63 |
| **Subtotal** | | | | **0** | | **787** | | **875** | | **915** | | **952** | | **1,292** | | **1,346** | | **1,386** | | **1,428** | | **857** | | **807** | | **705** | | **726** | | **12,076** |
| **Office equipment , furnishings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Routers and connectivity hardware | 3,000 | global | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 |
| Computers, desktop | 3,000 | each | 0 | 0 | 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 41 |
| Computers, laptops | 2,500 | each | 0 | 0 | 12 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 79 |
| Cell phones | 500 | each | 0 | 0 | 10 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 14 |
| Printers, laser, colour | 800 | each | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| Printers, all-in-one | 250 | each | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 |
| Phone system, landline | 4,500 | each | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 16 |
| Photocopier, colour | 5,200 | each | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 18 |
| Software licenses | 12,000 | each | 0 | 0 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 42 |
| Office furniture, desks / work stations | 1,200 | each | 0 | 0 | 18 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 37 |
| Office furniture, tables and chairs | 25,000 | global | 0 | 0 | 1 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 49 |
| Videoconference equipment | 7,500 | each | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 18 |
| Data projector | 750 | each | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| Report binding equipment | 450 | each | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| Refrigerator | 2,000 | each | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 |
| Small kitchen appliances and items | 2,500 | global | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 |
| Office space rehabilitation | 30,000 | global | 0 | 0 | 1 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 105 |
| First aid kits, extinguishers, etc. | 2,000 | global | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 7 |
| **Subtotal** | | | | **0** | | **175** | | **0** | | **0** | | **0** | | **141** | | **0** | | **0** | | **0** | | **143** | | **0** | | **0** | | **0** | | **458** |
| **Field equipment** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS devices | 700 | each | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 |
| Video cameras | 600 | each | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 |
| Portable flipcharts | 300 | each | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 |
| ZOPP kits, or equivalent | 150 | each | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 |
| Vehicle, 4x4 crossover | 48,000 | each | 0 | 0 | 2 | 99 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 2 | 99 |
| Vehicle, passenger sedan | 32,000 | each | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | 0 | 0 |
| **Subtotal** | | | | **0** | | **103** | | **0** | | **0** | | **0** | | **3** | | **0** | | **0** | | **0** | | **2** | | **0** | | **0** | | **0** | | **108** |
| **Office expenditures, recurrent** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sundry office supplies | 10,000 | global | 0 | 0 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 13 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 10 | 119 |
| Sundry office consumibles | 8,000 | global | 0 | 0 | 1 | 8 | 1 | 8 | 1 | 9 | 1 | 9 | 1 | 9 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 10 | 95 |
| Rent | 25,000 | annual | 0 | 0 | 1 | 26 | 1 | 27 | 1 | 27 | 1 | 28 | 1 | 29 | 1 | 30 | 1 | 31 | 1 | 32 | 1 | 24 | 1 | 25 | 1 | 26 | 1 | 27 | 11 | 331 |
| Utilities | 15,000 | annual | 0 | 0 | 1 | 15 | 1 | 16 | 1 | 16 | 1 | 17 | 1 | 17 | 1 | 18 | 1 | 18 | 1 | 19 | 1 | 15 | 1 | 15 | 1 | 16 | 1 | 16 | 11 | 199 |
| Minor office maintenance | 5,000 | global | 0 | 0 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 5 | 11 | 66 |
| Equipment maintenance | 7,500 | global | 0 | 0 | 1 | 8 | 1 | 8 | 1 | 8 | 1 | 8 | 1 | 9 | 1 | 9 | 1 | 9 | 1 | 10 | 1 | 7 | 1 | 8 | 1 | 8 | 1 | 8 | 11 | 99 |
| Vehicle expenses | 10,500 | global | 0 | 0 | 1 | 11 | 1 | 11 | 1 | 11 | 1 | 12 | 1 | 12 | 1 | 13 | 1 | 13 | 1 | 13 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 10 | 125 |

**ANNEX B7: DETAILED PROGRAM MANAGEMENT COSTS, NRWSSP (USD X1000)**

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| Insurance | 9,000 | global | 0 | 0 | 1 | 9 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 10 | 107 |
| Other consumibles | 4,000 | global | 0 | 0 | 1 | 4 | 1 | 4 | 1 | 4 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 10 | 48 |
| Cleaning services | 18,000 | global | 0 | 0 | 1 | 19 | 1 | 19 | 1 | 20 | 1 | 20 | 1 | 21 | 1 | 21 | 1 | 22 | 1 | 23 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 13 | 10 | 214 |
| Security services | 24,000 | global | 0 | 0 | 1 | 25 | 1 | 25 | 1 | 26 | 1 | 27 | 1 | 28 | 1 | 29 | 1 | 30 | 1 | 30 | 1 | 16 | 1 | 16 | 1 | 17 | 1 | 17 | 10 | 285 |
| IT services | 10,000 | global | 0 | 0 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 13 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 10 | 119 |
| Postage, courrier expenses | 4,800 | global | 0 | 0 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 10 | 57 |
| Printing and reproduction services | 16,000 | global | 0 | 0 | 1 | 16 | 1 | 17 | 1 | 17 | 1 | 18 | 1 | 19 | 1 | 19 | 1 | 20 | 1 | 20 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 10 | 190 |
| Promotional items | 8,000 | global | 0 | 0 | 1 | 8 | 1 | 8 | 1 | 9 | 1 | 9 | 1 | 9 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 10 | 95 |
| Banking and financial services | 12,000 | global | 0 | 0 | 1 | 12 | 1 | 13 | 1 | 13 | 1 | 14 | 1 | 14 | 1 | 14 | 1 | 15 | 1 | 15 | 1 | 8 | 1 | 8 | 1 | 8 | 1 | 9 | 10 | 143 |
| **Subtotal** | | | | **0** | | **192** | | **198** | | **204** | | **210** | | **217** | | **223** | | **230** | | **237** | | **139** | | **143** | | **147** | | **152** | | **2,292** |
| **SUBTOTAL - NATIONAL** | | | | **0** | | **2,202** | | **2,120** | | **2,197** | | **2,272** | | **3,189** | | **3,151** | | **3,245** | | **3,343** | | **2,405** | | **2,128** | | **1,855** | | **1,910** | | **30,017** |
| **PROVINCIAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Staff salaries** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Provincial Programme Coordinator | 85,000 | per. year | 0 | 0 | 3 | 263 | 3 | 271 | 3 | 279 | 3 | 287 | 3 | 296 | 3 | 304 | 3 | 314 | 3 | 323 | 2 | 166 | 1 | 114 | 1 | 118 | 1 | 121 | 29 | 2,855 |
| WASH Technical Advisor | 70,000 | per. year | 0 | 0 | 3 | 216 | 3 | 223 | 3 | 229 | 3 | 236 | 3 | 243 | 3 | 251 | 3 | 258 | 3 | 266 | 1 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 1,992 |
| WASH Community Mobilisation Advisor | 70,000 | per. year | 0 | 0 | 3 | 216 | 3 | 223 | 3 | 229 | 3 | 236 | 3 | 243 | 3 | 251 | 3 | 258 | 3 | 266 | 1 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 1,992 |
| Procurement Specialist | 70,000 | per. year | 0 | 0 | 3 | 216 | 3 | 223 | 3 | 229 | 3 | 236 | 3 | 243 | 3 | 251 | 3 | 258 | 3 | 266 | 1 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 1,992 |
| Office Assistant | 35,000 | per. year | 0 | 0 | 3 | 108 | 3 | 111 | 3 | 115 | 3 | 118 | 3 | 122 | 3 | 125 | 3 | 129 | 3 | 133 | 2 | 69 | 1 | 47 | 1 | 48 | 1 | 50 | 29 | 1,176 |
| Driver / Office Aide | 20,000 | per. year | 0 | 0 | 3 | 62 | 3 | 64 | 3 | 66 | 3 | 68 | 3 | 70 | 3 | 72 | 3 | 74 | 3 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 550 |
| Seconded Staff | 30,000 | per. year | 0 | 0 | 4 | 124 | 4 | 127 | 4 | 131 | 4 | 135 | 4 | 139 | 4 | 143 | 4 | 148 | 4 | 152 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 1,099 |
| **Subtotal** | | | | **0** | | **1,205** | | **1,241** | | **1,278** | | **1,317** | | **1,356** | | **1,397** | | **1,439** | | **1,482** | | **440** | | **161** | | **166** | | **171** | | **11,655** |
| **Other staff costs** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Staff benefits (60% of salary) | 45% | global | 45% | 0 | 45% | 542 | 45% | 559 | 45% | 575 | 45% | 593 | 45% | 610 | 45% | 629 | 45% | 648 | 45% | 667 | 45% | 198 | 45% | 73 | 45% | 75 | 45% | 77 | | 5,245 |
| Flights (international) | 3,500 | each | 0 | 0 | 3 | 11 | 6 | 22 | 6 | 23 | 6 | 24 | 6 | 24 | 10 | 42 | 6 | 26 | 6 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 198 |
| Per diems (international) | 250 | day | 0 | 0 | 9 | 2 | 18 | 5 | 18 | 5 | 18 | 5 | 18 | 5 | 30 | 9 | 18 | 6 | 18 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 147 | 42 |
| Flights (national) | 500 | each | 0 | 0 | 30 | 15 | 30 | 16 | 30 | 16 | 30 | 17 | 120 | 70 | 120 | 72 | 120 | 74 | 120 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 600 | 356 |
| Per diems (national) | 125 | day | 0 | 0 | 1,500 | 193 | 1,600 | 212 | 1,700 | 232 | 1,600 | 225 | 3,200 | 464 | 3,200 | 478 | 3,200 | 492 | 3,200 | 507 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,200 | 2,803 |
| Staff incentives | 5,000 | per prov. | 0 | 0 | 3 | 15 | 3 | 16 | 3 | 16 | 3 | 17 | 4 | 23 | 4 | 24 | 4 | 25 | 4 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 162 |
| **Subtotal** | | | | **0** | | **779** | | **830** | | **868** | | **880** | | **1,196** | | **1,253** | | **1,269** | | **1,307** | | **198** | | **73** | | **75** | | **77** | | **8,805** |
| **Office equipment , furnishings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Routers and connectivity hardware | 3,000 | per prov. | 0 | 0 | 3 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 27 |
| Computers, desktop | 3,000 | each | 0 | 0 | 6 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 62 |
| Computers, laptops | 2,500 | each | 0 | 0 | 9 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 71 |
| Cell phones | 500 | each | 0 | 0 | 12 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 18 |
| Printers, laser, colour | 800 | each | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 |
| Printers, all-in-one | 250 | each | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 |
| Phone system, landline | 4,500 | each | 0 | 0 | 3 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 25 |
| Photocopier, colour | 5,200 | each | 0 | 0 | 3 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 29 |
| Software licenses | 12,000 | per prov. | 0 | 0 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 42 |
| Office furniture, desks / work stations | 1,200 | each | 0 | 0 | 24 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 53 |
| Office furniture, tables and chairs | 25,000 | per prov. | 0 | 0 | 3 | 77 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 139 |
| Videoconference equipment | 7,500 | each | 0 | 0 | 3 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 42 |
| Data projector | 750 | each | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 |
| Report binding equipment | 450 | each | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 |
| Refrigerator | 2,000 | each | 0 | 0 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 11 |
| Small kitchen appliances and items | 2,500 | per prov. | 0 | 0 | 3 | 8 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 9 | 26 |
| Office space rehabilitation | 30,000 | per prov. | 0 | 0 | 3 | 93 | 0 | 0 | 0 | 8 | 1 | 17 | 1 | 35 | 1 | 18 | 1 | 18 | 1 | 19 | 1 | 39 | 1 | 20 | 1 | 21 | 1 | 21 | 9 | 309 |
| First aid kits, extinguishers, etc. | 2,000 | per prov. | 0 | 0 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 9 |
| **Subtotal** | | | | **0** | | **349** | | **1** | | **9** | | **18** | | **202** | | **19** | | **20** | | **21** | | **169** | | **22** | | **22** | | **23** | | **876** |
| **Field equipment** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS devices | 700 | each | 0 | 0 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 39 |
| Video cameras | 600 | each | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 5 |
| Portable flipcharts | 300 | each | 0 | 0 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 16 |
| ZOPP kits, or equivalent | 150 | each | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 8 |
| Vehicle, 4x4 crossover | 48,000 | each | 0 | 0 | 3 | 148 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 1,113 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 1,386 |
| Vehicle, 4x4 pickup | 42,000 | each | 0 | 0 | 3 | 130 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 974 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 1,104 |
| **Subtotal** | | | | **0** | | **287** | | **0** | | **0** | | **0** | | **2,143** | | **0** | | **0** | | **0** | | **128** | | **0** | | **0** | | **0** | | **2,558** |
| **Office expenditures, recurrent** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sundry office supplies | 5,000 | per prov. | 0 | 0 | 3 | 15 | 3 | 16 | 3 | 16 | 3 | 17 | 4 | 23 | 4 | 24 | 4 | 25 | 4 | 25 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 32 | 189 |

**ANNEX B7: DETAILED PROGRAM MANAGEMENT COSTS, NRWSSP (USD X1000)**

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| Sundry office consumibles | 4,000 | per prov. | 0 | 0 | 3 | 12 | 3 | 13 | 3 | 13 | 3 | 14 | 4 | 19 | 4 | 19 | 4 | 20 | 4 | 20 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 32 | 151 |
| Rent | 10,000 | per prov. | 0 | 0 | 3 | 31 | 3 | 32 | 3 | 33 | 3 | 34 | 4 | 46 | 4 | 48 | 4 | 49 | 4 | 51 | 1 | 13 | 1 | 13 | 1 | 14 | 1 | 14 | 32 | 378 |
| Utilities | 1,500 | per prov. | 0 | 0 | 3 | 5 | 3 | 5 | 3 | 5 | 3 | 5 | 4 | 7 | 4 | 7 | 4 | 7 | 4 | 8 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 32 | 57 |
| Minor office maintenance | 5,000 | per prov. | 0 | 0 | 3 | 15 | 3 | 16 | 3 | 16 | 3 | 17 | 4 | 23 | 4 | 24 | 4 | 25 | 4 | 25 | 1 | 7 | 1 | 7 | 1 | 7 | 1 | 7 | 32 | 189 |
| Equipment maintenance | 7,500 | per prov. | 0 | 0 | 3 | 23 | 3 | 24 | 3 | 25 | 3 | 25 | 4 | 35 | 4 | 36 | 4 | 37 | 4 | 38 | 1 | 10 | 1 | 10 | 1 | 10 | 1 | 11 | 32 | 283 |
| Vehicle expenses | 10,500 | per prov. | 0 | 0 | 3 | 32 | 3 | 33 | 3 | 34 | 3 | 35 | 4 | 49 | 4 | 50 | 4 | 52 | 4 | 53 | 1 | 14 | 1 | 14 | 1 | 15 | 1 | 15 | 32 | 397 |
| Insurance | 9,000 | per prov. | 0 | 0 | 3 | 28 | 3 | 29 | 3 | 30 | 3 | 30 | 4 | 42 | 4 | 43 | 4 | 44 | 4 | 46 | 1 | 12 | 1 | 12 | 1 | 12 | 1 | 13 | 32 | 340 |
| Other consumibles | 4,000 | per prov. | 0 | 0 | 3 | 12 | 3 | 13 | 3 | 13 | 3 | 14 | 4 | 19 | 4 | 19 | 4 | 20 | 4 | 20 | 1 | 5 | 1 | 5 | 1 | 6 | 1 | 6 | 32 | 151 |
| Cleaning services | 18,000 | per prov. | 0 | 0 | 3 | 56 | 3 | 57 | 3 | 59 | 3 | 61 | 4 | 83 | 4 | 86 | 4 | 89 | 4 | 91 | 1 | 23 | 1 | 24 | 1 | 25 | 1 | 26 | 32 | 680 |
| Security services | 24,000 | per prov. | 0 | 0 | 3 | 74 | 3 | 76 | 3 | 79 | 3 | 81 | 4 | 111 | 4 | 115 | 4 | 118 | 4 | 122 | 1 | 31 | 1 | 32 | 1 | 33 | 1 | 34 | 32 | 907 |
| IT services | 10,000 | per prov. | 0 | 0 | 3 | 31 | 3 | 32 | 3 | 33 | 3 | 34 | 4 | 46 | 4 | 48 | 4 | 49 | 4 | 51 | 1 | 13 | 1 | 13 | 1 | 14 | 1 | 14 | 32 | 378 |
| Postage, courrier expenses | 4,800 | per prov. | 0 | 0 | 3 | 15 | 3 | 15 | 3 | 16 | 3 | 16 | 4 | 22 | 4 | 23 | 4 | 24 | 4 | 24 | 1 | 6 | 1 | 6 | 1 | 7 | 1 | 7 | 32 | 181 |
| Printing and reproduction services | 16,000 | per prov. | 0 | 0 | 3 | 49 | 3 | 51 | 3 | 52 | 3 | 54 | 4 | 74 | 4 | 76 | 4 | 79 | 4 | 81 | 1 | 21 | 1 | 22 | 1 | 22 | 1 | 23 | 32 | 605 |
| Promotional items | 8,000 | per prov. | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 4 | 37 | 4 | 38 | 4 | 39 | 0 | 0 | 1 | 10 | 1 | 11 | 1 | 11 | 1 | 11 | 28 | 262 |
| Banking and financial services | 12,000 | per prov. | 0 | 0 | 3 | 37 | 3 | 38 | 3 | 39 | 3 | 41 | 4 | 56 | 4 | 57 | 4 | 59 | 4 | 61 | 1 | 16 | 1 | 16 | 1 | 17 | 1 | 17 | 32 | 453 |
| **Subtotal** | | | | **0** | | **461** | | **475** | | **489** | | **504** | | **692** | | **713** | | **734** | | **716** | | **195** | | **201** | | **207** | | **213** | | **5,601** |
| **SUBTOTAL - PROVINCIAL** | | | | **0** | | **3,082** | | **2,547** | | **2,645** | | **2,719** | | **5,590** | | **3,382** | | **3,463** | | **3,526** | | **1,131** | | **456** | | **470** | | **484** | | **29,495** |
| **MUNICIPAL LEVEL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Staff salaries** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WASH coordinator | 30,000 | per. year | 0 | 0 | 25 | 579 | 25 | 597 | 25 | 410 | 25 | 211 | 125 | 3,260 | 250 | 4,478 | 250 | 2,306 | 250 | 2,375 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 975 | 14,216 |
| Communitty mobilisers | 25,000 | per. year | 0 | 0 | 45 | 869 | 45 | 895 | 45 | 615 | 45 | 317 | 185 | 4,021 | 375 | 5,597 | 375 | 2,883 | 375 | 2,969 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,490 | 18,165 |
| Mechanic, BMEA | 20,000 | per. year | 0 | 0 | 15 | 232 | 15 | 239 | 15 | 164 | 15 | 84 | 62 | 1,078 | 125 | 1,493 | 125 | 769 | 125 | 792 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 497 | 4,850 |
| Administrative staff subsidy (75% in years 1 a | 40,000 | per. year | 0 | 0 | 30 | 927 | 30 | 955 | 30 | 656 | 30 | 338 | 125 | 4,347 | 250 | 5,970 | 250 | 3,075 | 250 | 3,167 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 995 | 19,434 |
| **Subtotal** | | | | **0** | | **2,607** | | **2,685** | | **1,844** | | **950** | | **12,707** | | **17,538** | | **9,032** | | **9,303** | | **0** | | **0** | | **0** | | **0** | | **56,666** |
| **Other staff costs** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Staff benefits (60% of salary) | 30% | global | 30% | 0 | 30% | 782 | 30% | 806 | 30% | 553 | 30% | 285 | 30% | 3,812 | 30% | 5,261 | 30% | 2,710 | 30% | 2,791 | 30% | 0 | 30% | 0 | 30% | 0 | 30% | 0 | | 17,000 |
| Flights (international) | 3,500 | each | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Per diems (international) | 250 | day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Flights (national) | 500 | each | 0 | 0 | 15 | 8 | 15 | 8 | 15 | 8 | 15 | 8 | 45 | 26 | 45 | 27 | 45 | 28 | 45 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 240 | 141 |
| Per diems (national) | 125 | day | 0 | 0 | 7,500 | 724 | 10,000 | 995 | 10,000 | 683 | 12,000 | 422 | 50,000 | 5,434 | 78,000 | 5,821 | 80,000 | 3,075 | 80,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 327,500 | 17,154 |
| **Subtotal** | | | | **0** | | **1,514** | | **1,808** | | **1,244** | | **715** | | **9,272** | | **11,109** | | **5,812** | | **2,819** | | **0** | | **0** | | **0** | | **0** | | **34,295** |
| **Office equipment , furnishings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Routers and connectivity hardware | 3,000 | global | 0 | 0 | 20 | 62 | 10 | 32 | 0 | 0 | 0 | 0 | 145 | 504 | 75 | 269 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 867 |
| Computers, desktop | 3,000 | each | 0 | 0 | 20 | 62 | 10 | 32 | 0 | 0 | 0 | 0 | 145 | 504 | 75 | 269 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 867 |
| Computers, laptops | 2,500 | each | 0 | 0 | 20 | 52 | 10 | 27 | 0 | 0 | 0 | 0 | 145 | 420 | 75 | 224 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 722 |
| Cell phones | 500 | each | 0 | 0 | 40 | 21 | 20 | 11 | 0 | 0 | 0 | 0 | 350 | 203 | 150 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 560 | 324 |
| Printers, laser, black and white | 600 | each | 0 | 0 | 20 | 12 | 10 | 6 | 0 | 0 | 0 | 0 | 145 | 101 | 75 | 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 173 |
| Printers, all-in-one | 250 | each | 0 | 0 | 20 | 5 | 10 | 3 | 0 | 0 | 0 | 0 | 145 | 42 | 75 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 72 |
| Phone system, landline | 4,500 | each | 0 | 0 | 20 | 93 | 10 | 48 | 0 | 0 | 0 | 0 | 145 | 756 | 75 | 403 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 1,300 |
| Photocopier, black and white | 2,500 | each | 0 | 0 | 20 | 52 | 10 | 27 | 0 | 0 | 0 | 0 | 145 | 420 | 75 | 224 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 722 |
| Software licenses | 12,000 | each | 0 | 0 | 20 | 247 | 10 | 127 | 0 | 0 | 0 | 0 | 145 | 2,017 | 75 | 1,075 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 3,466 |
| Office furniture, desks / work stations | 1,200 | each | 0 | 0 | 100 | 124 | 50 | 64 | 0 | 0 | 0 | 0 | 885 | 1,231 | 585 | 838 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,620 | 2,257 |
| Office furniture, tables and chairs | 15,000 | global | 0 | 0 | 20 | 309 | 10 | 159 | 0 | 0 | 0 | 0 | 145 | 2,521 | 75 | 1,343 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 4,333 |
| Videoconference equipment | 7,500 | each | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Data projector | 750 | each | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Report binding equipment | 450 | each | 0 | 0 | 20 | 9 | 10 | 5 | 0 | 0 | 0 | 0 | 145 | 76 | 75 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 130 |
| Refrigerator | 2,000 | each | 0 | 0 | 20 | 41 | 10 | 21 | 0 | 0 | 0 | 0 | 145 | 336 | 75 | 179 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 578 |
| Small kitchen appliances and items | 1,500 | global | 0 | 0 | 20 | 31 | 10 | 16 | 0 | 0 | 0 | 0 | 145 | 252 | 75 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 433 |
| Office space rehabilitation | 18,000 | global | 0 | 0 | 20 | 371 | 10 | 191 | 0 | 0 | 0 | 0 | 145 | 3,026 | 75 | 1,612 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 5,199 |
| First aid kits, extinguishers, etc. | 1,500 | global | 0 | 0 | 20 | 31 | 10 | 16 | 0 | 0 | 0 | 0 | 145 | 252 | 75 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 433 |
| **Subtotal** | | | | **0** | | **1,520** | | **783** | | **0** | | **0** | | **12,663** | | **6,910** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **21,876** |
| **Field equipment** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GPS devices | 700 | each | 0 | 0 | 30 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 225 |
| Video cameras | 600 | each | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portable flipcharts | 300 | each | 0 | 0 | 30 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 96 |
| ZOPP kits, or equivalent | 150 | each | 0 | 0 | 30 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 48 |
| Vehicle, 4x4 pickup | 42,000 | each | 0 | 0 | 30 | 1,298 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 10,712 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 12,009 |
| Motorcycles | 3,000 | each | | 0 | 90 | 278 | 0 | 0 | 0 | 0 | 0 | 0 | 750 | 2,608 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 840 | 2,886 |
| **Subtotal** | | | | **0** | | **1,611** | | **0** | | **0** | | **0** | | **13,653** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **0** | | **15,265** |

**ANNEX B7: DETAILED PROGRAM MANAGEMENT COSTS, NRWSSP (USD X1000)**

| DESCRIPTION | UNIT COST 2014 | UNITS | YEAR 0 | | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | YEAR 6 | | YEAR 7 | | YEAR 8 | | YEAR 9 | | YEAR 10 | | YEAR 11 | | YEAR 12 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST | NO. | COST |
| **Office expenditures, recurrent** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sundry office supplies | 6,000 | global | 0 | 0 | 3 | 19 | 3 | 19 | 3 | 20 | 3 | 20 | 20 | 139 | 20 | 143 | 20 | 148 | 20 | 152 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 660 |
| Sundry office consumibles | 8,000 | global | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 20 | 185 | 20 | 191 | 20 | 197 | 20 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 879 |
| Rent | 25,000 | annual | 0 | 0 | 3 | 77 | 3 | 80 | 3 | 82 | 3 | 84 | 20 | 580 | 20 | 597 | 20 | 615 | 20 | 633 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 2,748 |
| Utilities | 8,000 | annual | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 20 | 185 | 20 | 191 | 20 | 197 | 20 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 879 |
| Minor office maintenance | 5,000 | global | 0 | 0 | 3 | 15 | 3 | 16 | 3 | 16 | 3 | 17 | 20 | 116 | 20 | 119 | 20 | 123 | 20 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 550 |
| Equipment maintenance | 5,000 | global | 0 | 0 | 3 | 15 | 3 | 16 | 3 | 16 | 3 | 17 | 20 | 116 | 20 | 119 | 20 | 123 | 20 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 550 |
| Vehicle expenses | 10,500 | global | 0 | 0 | 3 | 32 | 3 | 33 | 3 | 34 | 3 | 35 | 20 | 243 | 20 | 251 | 20 | 258 | 20 | 266 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 1,154 |
| Insurance | 9,000 | global | 0 | 0 | 3 | 28 | 3 | 29 | 3 | 30 | 3 | 30 | 20 | 209 | 20 | 215 | 20 | 221 | 20 | 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 989 |
| Other consumibles | 3,000 | global | 0 | 0 | 3 | 9 | 3 | 10 | 3 | 10 | 3 | 10 | 20 | 70 | 20 | 72 | 20 | 74 | 20 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 330 |
| Cleaning services | 9,000 | global | 0 | 0 | 3 | 28 | 3 | 29 | 3 | 30 | 3 | 30 | 20 | 209 | 20 | 215 | 20 | 221 | 20 | 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 989 |
| Security services | 8,000 | global | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 20 | 185 | 20 | 191 | 20 | 197 | 20 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 879 |
| IT services | 8,000 | global | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 20 | 185 | 20 | 191 | 20 | 197 | 20 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 879 |
| Postage, courrier expenses | 3,500 | global | 0 | 0 | 3 | 11 | 3 | 11 | 3 | 11 | 3 | 12 | 20 | 81 | 20 | 84 | 20 | 86 | 20 | 89 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 385 |
| Printing and reproduction services | 3,000 | global | 0 | 0 | 3 | 9 | 3 | 10 | 3 | 10 | 3 | 10 | 20 | 70 | 20 | 72 | 20 | 74 | 20 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 330 |
| Promotional items | 4,000 | global | 0 | 0 | 3 | 12 | 3 | 13 | 3 | 13 | 3 | 14 | 20 | 93 | 20 | 96 | 20 | 98 | 20 | 101 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 440 |
| Banking and financial services | 8,000 | global | 0 | 0 | 3 | 25 | 3 | 25 | 3 | 26 | 3 | 27 | 20 | 185 | 20 | 191 | 20 | 197 | 20 | 203 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 92 | 879 |
| **Subtotal** | | | | **0** | | **380** | | **391** | | **403** | | **415** | | **2,852** | | **2,937** | | **3,025** | | **3,116** | | **0** | | **0** | | **0** | | **0** | | **13,521** |
| **SUBTOTAL - MUNICIPAL** | | | | **0** | | **7,633** | | **5,668** | | **3,492** | | **2,080** | | **51,147** | | **38,494** | | **17,869** | | **15,238** | | **0** | | **0** | | **0** | | **0** | | **141,622** |
| **PROGRAM TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase 1 | | | | 0 | | 12,918 | | 10,334 | | 8,333 | | 7,072 | | | | | | | | | | | | | | | | 38,657 |
| Phase 2 | | | | | | | | | | | | | | 59,926 | | 45,027 | | 24,577 | | 22,107 | | | | | | | | 151,638 |
| Phase 3 | | | | | | | | | | | | | | | | | | | | | | 3,536 | | 2,584 | | 2,325 | | 2,395 | | 10,839 |
| **GRAND TOTAL** | | | | **0** | | **12,918** | | **10,334** | | **8,333** | | **7,072** | | **59,926** | | **45,027** | | **24,577** | | **22,107** | | **3,536** | | **2,584** | | **2,325** | | **2,395** | | **201,134** |

*1. Costs subject to 3% annual inflation.*

*2. PMU cost (personnel time, expenses) not included.*

*3. Year 1 in new & existing prov / municipalities will cost the same.*

# ANNEX C

# Development of unit costs for water supply

# Annex C: Development of Unit Costs for Water Supply

# 1 General

The investment plan is based on unit costs per capita for both capital and O&M costs, the development of which is outlined in the following sections.

# 2 Unit costs for capital investment

Very little reliable cost data was available for water infrastructure construction in Angola. Based on PAT cost data made available by the GoA[45] and data collected for various other countries and extrapolated to Angola, a set of unit costs was calculated for use in the investment planning exercise. Included in the unit costs for construction are the costs of labour, equipment and material for infrastructure construction. Design, construction supervision and other program costs are addressed in the Phase 2 Report, Section 8.

## 2.1 Methodology

### 2.1.1 Data collection and analysis

In addition to cost data provided in PAT reports, a significant amount of cost data was collected from external sources and analysed for possible application to the NRWSSP cost model, including data from: WASHCost[46]; IRC; the Africa Infrastructure Country Diagnostic (World Bank); WaterAID; WHO; and recent Cowater International infrastructure construction projects in Ghana, Mozambique and Lesotho. To determine which cost data would be used to influence the NRWSSP cost model, the available data was first assessed and categorised by type of system. The following conditions were applied to the data to assess its relevance to estimating NRWSSP costs:

- The type of system is well understood and in line with selected technologies for NRWSSP;
- The beneficiary population size is known and less than 6,000 people;
- The cost data is relatively recent (oldest data used is from 2006, most was more recent);
- The cost data includes only infrastructure construction; and,
- Costs were within a reasonable range in comparison to other data collected.

As a first step, data from the June 2012 PAT monthly report was analysed. This report was the most recent report available at the time of the study and included cost data for a portion of the systems constructed within the programme up to that date. The data for systems with associated cost information was reviewed using the above criteria. This resulted in useable cost data for 250 systems, including five of the six system types proposed for the NRWSSP (all but the ram pump option). The range of unit costs from the PAT data is shown in Table C-1. Obvious outliers were removed from the data set. Median system and per capita unit costs were then calculated for each system type. In general, PAT construction cost figures were within the same range as costs from other sources.

[45] Ministério da Energia e Águas (2012). Programa "Água para Todos" Relatória Mensal No. 35/RM, Junho 2012. Preparado por: Vista Water.

[46] WASHCost is a multi-year IRC run study into the actual costs of providing sustainable water and sanitation services.

**Table C-1: Range of PAT unit costs for each system type (USD)**

| TECHNOLOGY TYPE | MINIMUN PER CAPITA COST (USD) | MAXIMUM PER CAPITA COST (USD) |
|---|---|---|
| Borehole / Handpump | $12 | $160 |
| Borehole / solar pump / piped dist. | $68 | $170 |
| Borehole / electro-mechanical pump / piped dist. | $65 | $570 |
| Spring / gravity-fed / piped dist. | $45 | $230 |
| Spring / ram pump / piped dist. | No data | No data |
| Surface water / /electro-mech. Pump / treatment / piped dist. | $60 | $500 |

The PAT figures were not reliable as the sole source of data due to the wide range of costs and the number of obvious outliers in the data. Therefore, in addition to PAT costs, data from seven different sources in three countries (Mozambique, Ghana and Lesotho) as well as the sub-Saharan African region was found to meet the above criteria and was used to complement PAT cost figures. This aggregate data set was then used to generate approximate unit cost estimates for five of the six selected technology types. No data was available for the ram pump with piped distribution.

Data from each country and data source was collated, obvious outliers removed, and median 'total' and 'per capita' unit costs were calculated for each system type. Using the median decreases the emphasis on outliers compared to using an average value and is therefore a more representative measure. In some cases the average was used due to insufficient data, or data sets where it was deemed inappropriate to use the median (small, or split data sets with no obvious outliers). Also, in some cases, several sources of data provided information for the same country and system type. To avoid skewing the unit costs towards any particular country, an average per country cost was then calculated.

For piped systems (springs with gravity-fed distribution, boreholes with solar pump and piped distribution, boreholes with electromechanical pump and piped distribution and surface water with a pump, treatment and piped distribution) the per capita unit cost was calculated based on actual beneficiary populations per system. The cost of these systems is dependent on the size of the system itself (length of distribution system, number of standpipes, size of reservoir, etc.) and therefore on the population to be served.

For boreholes with hand pumps, the per capita unit cost was calculated based on an assumed maximum of 250 beneficiaries per water point as defined by DNA.

On further analysis, one data set was removed from the calculations for springs with gravity distribution. The figures from Lesotho were based on average population figures that were significantly different from what is expected in Angola. Additionally, the cost of a spring system is highly dependent on the context; therefore it was deemed inappropriate to translate the costs from another country to Angola for this particular system type. For springs, only the PAT data contributed to the unit costs.

### 2.1.2 Conversion to present value common currency

The data collected included costs in different currencies from different countries, ranging from 2006 to 2014. To be useful, the data was converted to a common currency and brought to present value.

The US Dollar (USD) was used as the common currency for comparison purposes. The average exchange rate for the applicable year and currency was used to convert all cost data to USD.

Initially, the inflation rate as measured by the annual growth rate of the *GDP implicit deflator* (the rate of price change in the economy as a whole, which is published annually for all countries by the World Bank[47]) was applied to the data to bring all costs to equivalent 2014 USD values. The resulting figures were found to be unsatisfactory, as the present value costs calculated for the systems were significantly beyond what could be considered reasonable based on the information gathered. Data from specific sources (e.g. the same project) where costs were available for the same type of system over a number of years indicated that water infrastructure construction costs have increased little from year to year, in general, and have not kept pace with GDP-based inflation rates which are based on a 'consumer basket-of-goods'.

Given this initial result, an alternate method of applying inflation was used which was based on a WaterAID study of costs in Mozambique[48], in which the inflation rate applied to infrastructure constructed was calculated to be 1%. This rate resulted in costs that were in line with actual cost increases over time as seen in the data collected for this study. Factors contributing to a slower rise in construction costs compared with the rate of inflation include improvements in tendering processes, increased contractor experience, improved efficiencies, changes in technologies, increased competition, etc. This inflation rate was applied to the system and unit costs to calculate the costs in 2014 US dollars (i.e. present value). For the Angolan PAT data, it was assumed that the costs were from 2012, having been published in that year. For consistency, the same inflation rate was applied to this data to calculate the present value. Any potential error introduced would be minimal if the actual rate of inflation in construction costs was greater than this because the time over which the increase occurred was short.

### 2.1.3 Extrapolating costs to Angola

The average total and unit costs for each country were then extrapolated to the Angolan context to be relevant to the NRWSSP. The International Comparison Program (ICP) of the World Bank publishes price level indices (PLIs) on an irregular basis, the most recent study having been published in 2008 and reflecting 2005 data[49]. Using a PLI allows comparisons between costs across countries at the level of overall GDP[50], or its sub-components. GDP is a high-level measure of a country's economy and takes into account all sectors within that country's economy. The construction industry component of GDP is difficult to estimate and also to compare. This is due to the variety of projects and techniques in different parts of the world. Although the ICP does calculate PLIs for the construction industry component of GDP, no data was available for Angola.

As a result, the best available method to extrapolate the unit costs calculated for each country to the Angolan context was to apply the GDP PLI. This method is imperfect, being

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[47] World Bank (2014). *Open Data: Inflation Rate, GDP Deflator annual (%)*. Source: http://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG/countries/CD-ZF-XM?display=default. Accessed March 27, 2014.

[48] WaterAid Moçambique (2014). *Análise do Financiamento no Sector de Água e Saneamento em Moçambique*. Preparado por: Centro de Integridade Pública.

[49] World Bank (2008). *Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program.* Washington.

[50] A PLI indicates the price of GDP in an economy if it were "purchased" after acquiring local currency at the prevailing exchange rate.

based on 2005 data and on the GDP as a whole, however serves as the only reliable method available. This method was used by WASHCost to compare costs across countries[51]. The PLI for each country was compared with the PLI for Angola and an 'extrapolation factor' was calculated to be applied to the country-based unit costs. Once costs were extrapolated, an average cost for each type of system was determined in 2014 USD for Angola.

## 2.2 Unit costs for capital investment

The average system and per capita unit costs calculated for Angola are shown in Table C-2. These unit costs fall within the range of PAT unit costs (Table C-1) and are therefore a reasonable estimate for planning purposes. Included in the unit costs for construction are:

- The costs of labour, equipment and material for infrastructure construction; and
- 70% of capital maintenance costs, including: major repairs or other non-recurrent costs related to asset renewal, replacement and rehabilitation necessary to keep systems running but which is beyond routine maintenance work. Capital maintenance is discussed further in Section 3 under system O&M costs (communities are assumed to bear the remaining 30% of capital maintenance investment within their fees structure).

As no data for a piped system using a ram pump was available, this was calculated based on the cost for a spring-fed gravity system with the additional estimated cost of a ram pump.

**Table C-2: Average unit capital costs for water system construction (USD)**

| TECHNOLOGY TYPE | AVG. SYSTEM COST | AVG. NO. USERS / SYSTEM | BASE CAPITAL COST | 70% CAPITAL MAINT. 1 | TOTAL |
|---|---|---|---|---|---|
| Borehole / handpump | 16,730 | 250 | 66.90 | 1.55 | 68.45 |
| Borehole / solar pump / piped dist. | 95,710 | 650 | 148.20 | 5.45 | 153.65 |
| Borehole / electromech. pump / piped dist. | 318,280 | 2,200 | 144.70 | 5.45 | 150.15 |
| Spring / gravity-fed / piped dist. | 108,390 | 950 | 116.60 | 1.18 | 117.78 |
| Spring / ram pump / piped dist. | 113,390 | 950 | 122.00 | 1.18 | 123.18 |
| Surface water / electromech. pump / treatment / piped dist. | 354,840 | 1,950 | 183.20 | 7.09 | 190.29 |

*1. Capital maintenace for major non-recurrent system repair & improvement (see Section 4.1.8 of Phase 2 Report).*

*2. Source: Cowater 2014*

# 3 Operation & maintenance unit costs

The cost of O&M is the responsibility of the beneficiary community and, therefore, it has not been included in the overall NRWSSP investment budget. O&M costs have nevertheless been estimated herein for purposes of information and comparison.

[51] Burr, P., et al. (2012). *Executive Summary: The Recurrent Expenditure Gap: Failing to Meet and Sustain Basic Water Services.* WASHCost Working Paper No. 8, IRC.

## 3.1 Methodology

Cost data related to operation and maintenance was collected from the same sources as those used to determine unit costs for infrastructure construction with one exception: no data was available for O&M costs in Angola specifically. Data was analysed and costs were categorised per type of system. Only two data sets were deemed to be useable for this study (Baumannn, 2006 and Nyarko et al, 2010), due mainly to insufficient information on what costs were included in the O&M costs. Following the procedure used above for calculating infrastructure unit costs, O&M costs for Angola were estimated for two system types: boreholes with hand pumps and mechanised pumping systems with piped networks. No data was available for other system types. These costs were deemed unrepresentative of costs in Angola because: i) there was insufficient data available to determine representative average costs which could then be translated to the Angolan context; and ii) the costs included in actual O&M expenditures are likely insufficient for long-term sustainability of the infrastructure.

As a result, a different approach was used to calculate community O&M expenditure required to maintain the infrastructure based on recent WASHCost calculations and analysis. WASHCost has developed a set of benchmarks[52] indicating the recurrent expenditure per person required to sustain services over time. These benchmarks are higher than actual recurrent costs currently funded by most African governments. Expenditure below the minimum benchmark risks reduced service levels and will likely lead to long-term failure. These benchmarks were used to calculate the required level of O&M expenditure in Angola.

During the analysis to calculate the infrastructure unit costs (above), the costs calculated for Angola were compared to the WASHCost benchmarks for capital costs. The costs calculated for Angola were approximately 90% of the maximum benchmark (translated to the Angolan context) in both the hand pump and small scheme cases. Therefore, O&M costs for Angola were calculated by determining the value equivalent to 90% of the upper WASHCost benchmarks for recurrent expenditures.

The O&M costs for spring-fed gravity systems and treated surface water systems are not included in the WASHCost benchmarks. For spring-fed gravity systems it is known that the O&M cost of such systems should be less than the O&M cost of a borehole with a hand pump[53]. In the absence of any relevant cost data, the O&M cost for spring-fed gravity systems was calculated using the minimum WASHCost benchmark in a similar manner to the calculation of the other O&M costs for Angola. It can be assumed that the O&M cost for a ram pump system would be similar. For treated surface water systems, the O&M cost was calculated based on that of a pumped groundwater system with a distribution system with the additional costs of electricity, operation and maintenance for the treatment system (e.g. skilled operator time, chemicals and consumables, replacement parts etc.).

In the case of community-level O&M expenditure, the community will be responsible for operational and minor maintenance costs[54] (i.e. routine minor maintenance needed to keep systems running at design performance, but not major repairs or renewals which are recognised as non-recurrent. Regular O&M costs include the cost of spare parts, mechanic

[52] WASHCost (2012). *Funding Recurrent Costs for Improved Rural Water Services*. WASHCost Infosheet No. 3, December 2012.
[53] WaterAID (2013). *Gravity-fed Schemes.* Technical Brief: January 2013. Available online at www.wateraid.org/technologies.
[54] Fonseca, C. et al. (2011) *Life-cycle Costs Approach: Costing Sustainable Services*. WASHCost Briefing Note 1a, IRC.

services and transportation for a borehole; labour, fuel, chemicals, materials, etc. for a small piped system).

Expenditure on major repairs or other non-recurrent costs is referred to as "capital maintenance", and refers to asset renewal, replacement and rehabilitation necessary to keep systems running but which is beyond routine maintenance work. This includes occasional costs related to restoring system functionality such as replacing pump rods or foot valves in the case of a hand pump, or replacing a diesel generator in mechanized systems. This approach was used to calculate the community O&M costs for Angola. As suggested by Baumann (2006)[55], this report provisionally assumes that communities will be responsible for 30% of capital maintenance costs (paid through regular water fees), while higher levels of government (local, provincial and federal) be responsible for the remaining 70%.

Using the WASHCost benchmarks for capital maintenance, the average cost per person was calculated for the Angolan context using the same method as that used to determine the operation and minor maintenance costs. Costs for Angola were calculated by determining the value equivalent to 90% of the upper WASHCost benchmarks (translated to the Angolan context using the PLI extrapolation factor). The community share of this cost (30%) was then added to the operation and minor maintenance cost for each type of system. For spring-fed gravity systems and ram pumping systems, the minimum benchmarks were used as an estimate, as was done for operation and minor maintenance costs.

## 3.2 Unit costs for community level O&M

The average per capita costs of operation and maintenance estimated for Angola are shown in Table C-3. The table shows, for each type of system:

- The basic cost of routine minor maintenance, minor repairs and operation of the system (column A).
- Necessary capital expenditure (asset renewal, replacement and rehabilitation) to ensure long-term sustainability (column B). 30% of this cost has is allocated to communities (column C) and is therefore added to the base O&M cost. The remaining 70% of future capital maintenance costs will be borne by various levels of government, and is included in capital cost calculations (See Section 8 of main Phase 2 Report).
- The total O&M cost to be covered by the community, calculated as the basic O&M cost plus 30% of the capital maintenance cost (column D).

[55] Baumann, E. (2006). *Do operation and maintenance pay?* Waterlines Vol 25, No 1, pp10-12. As Quoted in: Carter et al. *User financing of rural handpump water services*. IRC Symposium - 2010 Pumps, Pipes and Promises. WaterAid, UK.

**Table C-3: Average unit costs for water system O&M (USD/person/year, 2014)**

| TECHNOLOGY TYPE | BASE O&M COST | FULL CAPITAL MAINT. COST (1) | 30% CAPITAL MAINT. (1) | TOTAL |
|---|---|---|---|---|
| | *A* | *B* | *C* | *D=A+C* |
| Borehole / handpump | 1.11 | 2.23 | 0.67 | 1.78 |
| Borehole / solar pump / piped dist. | 2.78 | 7.77 | 2.33 | 5.11 |
| Borehole / electromech. pump / piped dist. | 5.56 | 7.78 | 2.33 | 7.90 |
| Spring / gravity-fed / piped dist. | 1.05 | 3.93 | 1.18 | 2.23 |
| Spring / ram pump / piped dist. | 1.05 | 3.93 | 1.18 | 2.23 |
| Surface water / electromech. pump / treatment / piped dist. | 10.27 | 23.63 | 7.09 | 17.36 |

*1. Capital maintenace for major non-recurrent repair & improvement (see Section 4.1.8 of Phase 2 report.)*

It is important to note that no data on current rural water fees in Angola was obtained for this report. These theoretical cost estimates represent an ideal scenario in terms of community O&M expenditure required to maintain the infrastructure over the long term.

In practice, user fees should reflect the real expected cost of maintaining each system. This will depend on type of technology and the overall size of the system, as well on the type of arrangement or service agreement made for carrying out operation and maintenance.

Once the Program is underway, further work will be necessary to establish an approach to tariff structures which is in line with national policy and regulations, and which will provide the community with sufficient funds to pay for adequate servicing.

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# ANNEX D

# NRWSSP Phase 1 report synthesis

# Annex D: NRWSSP Phase 1 report synthesis

The Government of Angola (GoA), under the leadership of the Ministry of Energy and Water's National Directorate of Water (MINEA/DNA) endeavours to initiate planning of a comprehensive National Rural Water Supply, Sanitation and Hygiene Programme, described by the acronym NRWSSP.

The Phase 1 report provided an analysis of: the Angolan policy and legal environment; current principles, strategies, practices and experiences in rural water supply and sanitation; the sub-sector's capacity building needs; and the performance monitoring and information management system. It then proposed a general framework for the NRWSSP, including policy reforms, project selection criteria, overarching programme principles and approaches, and an implementation strategy.

The key elements of the NRWSSP are projected to include the following, largely aligned with existing sector principles and policies that have not as yet been fully conceptualised and regimented:

- Concurrent implementation of water supply, sanitation, and hygiene components;
- Application of the Demand-Responsive Approach (DRA) which greatly expands community involvement and commitment;
- Widespread implementation of the Community Management Model for Water Supply (MoGeCA) approach in all its facets;
- The initiation of an intensive capacity building programme, especially at the municipal level;
- Improved infrastructure quality brought about by the development and application of new standards and norms, implementation and supervision rules and contract management procedures;
- Application of transparent project selection criteria expected to result in more efficient, effective and equitable resource allocation;
- Increased attention to post-construction operability of infrastructure;
- Refinement of the sector's performance monitoring system for rural water, sanitation and hygiene (WASH); and
- Improved communications, accountability, and information exchange amongst stakeholders.

The NRWSSP incorporates multiple lessons learnt from the national Water for All Programme (PAT). PAT demonstrated that the private sector is able to quickly expand to new geographic zones and adopt new technologies. Conversely greater attention is required in supervising private sector design and construction activities. PAT also demonstrated the critical importance of preparing GAS and local governments to assume their roles in water supply operations and maintenance, sparking the approval of MoGeCA. Technologically, the programme was able to successfully implement photovoltaic pumped systems, while at the same time demonstrating the failure of package treatment plants. Spare parts supply, however, continues to present a challenge to achieving sustainable hand pumps.

For implementing the NRWSSP new subsector tools and strategies will be prepared and implemented, such as: (i) rural water and sanitation norms and standards; (ii) a set of performance indicators and benchmarks; (iii) a capacity building plan; (iv) the demand-responsive approach; (v) tariff and subsidy guidance; (vi) information management mechanisms; (vii) instruments for achieving improved communications, transparency and accountability of all stakeholders; and (viii) post-construction support models.

Regarding sanitation more specifically, the Community-Led Total Sanitation (STLC) approach will be augmented by the application of sanitation marketing, the introduction of additional sanitation options, and concerted efforts to assist the domestic private sector in expanding household sanitation.

Local government will serve as the NRWSSP fulcrum. Given the overwhelming need for improved capacity at all levels one technical assistance team will be mobilised to meet the needs of the national and provincial levels, and another will be installed in each pilot province to support the building of local capacity in the public and private realms, with special emphasis on municipal governments.

Table D-1 outlines the proposed NRWSSP principles, their current status and implications for the sector.

**Table D-1: Proposed NRWSSP Principles**

| PRINCIPLE | CURRENT STATUS | CONSENSUS OPINION | IMPLICATIONS |
|---|---|---|---|
| **Access to improved water as a human right** | Enshrined in 2002 Water Law; United Nations Resolution 64/292 of 2012 | Widespread support and agreement | Continued sector investment; renewed emphasis on sustainable service provision |
| **Access to improved sanitation as a human right** | United Nations Resolution 64/292 of 2012 | Widespread support and agreement | Continued sector investment; need for new strategies and tools |
| **Water as a social and economic good** | Enshrined in 2002 Water Law | Widespread support and agreement | Subsidy levels and mechanisms to be developed |
| **User pays / Polluter pays** | Contained in Water Sector Strategy of 2002 | Generally supported, though government subsidies expected | Subsidy and cost recovery levels and mechanisms to be developed; DRA introduced |
| **Cost recovery is important goal** | Contained in Water Sector Strategy of 2002 | Generally supported, though not widely enforced | Subsidy levels and mechanisms to be developed; DRA introduced |
| **Private sector participation in GAS strengthening construction, operation, and maintenance** | Contained in Water Sector Strategy of 2002 | Widely supported in the area of construction, not widely supported in the area of GAS facilitation and operations | Outsourcing, GAS strengthening, O&M and post-construction support models to be developed; capacity building plans required; dissemination plans needed |
| **Decision-making at lowest level (Principal of Subsidiarity)** | Contained in Water Sector Strategy of 2002 | Widely supported in theory, though very gradually being implemented | Decentralisation to be effectively implemented, participatory planning needs to be developed |
| **Complementarity of rural water supply and sanitation** | Contained in Water Sector Strategy of 2002 | Generally supported in theory, though sparingly implemented | Coordination in planning and execution needed to execute this principle |
| **Use of appropriate technology** | Contained in Water Sector Strategy of 2002 | Generally supported, though not clearly understood or implemented | Operational strategy needs to be developed; links to subsidy levels and application of DRA |
| **User participation in all aspects of service delivery and provision** | Contained in Water Sector Strategy of 2002; MoGeCA approved for roll-out in 2012 | Generally supported, though not clearly understood or widely implemented | MoGeCA roll-out planning; Alternative O&M and post-construction support models to be developed; DRA methodology prepared; planning for cost recovery needed |
| **Human resource development is crucial** | Contained in Water Sector Strategy of 2002 | Widely supported, though not widely implemented | HRD strategic plans to be developed and to be implemented at all levels |
| **Source water** | Partially described in | Generally supported, | Policy, strategies, and tools |

| PRINCIPLE | CURRENT STATUS | CONSENSUS OPINION | IMPLICATIONS |
|---|---|---|---|
| **protection** | 2002 Water Law | though not clearly understood or widely implemented | needed for implementing source water protection |
| **Good governance** | Not currently a pillar in water supply/sanitation | Generally supported, though not clearly understood in the context of sector activities | Policy reform, strategies, and tools required for equitable investment planning, implementation and monitoring, gender mainstreaming, and servicing the disabled, the elderly, and other vulnerable households |
| **Accountability and transparency** | Not currently a pillar in water supply/sanitation | Supported in theory but not widely understood and practiced | Requires institutional culture change, new strategies, protocols, and tools; first step should be instituting an annual sector review process led by MINEA/DNAAS supported by sector multi-stakeholder support group |

Going through our set of programme principles, each principle is served by one or more strategies for achieving the professed principle, as shown in Table D-2 below.

**Table D-2: Proposed NRWSSP Strategies**

| PRINCIPLE | PROPOSED STRATEGIES |
|---|---|
| **Access to improved water and sanitation as human rights** | • Design and implementation of a NRWSSP;<br>• Preparation of rural water and sanitation policies, methodologies, approaches, and tools that must be implemented by investment or support programmes;<br>• Emphasis on achieving quality, sustainable services. |
| **Water as a social and economic good / User-Polluter pays / Cost recovery is important goal** | • Prepare and widely disseminate a subsidy and tariff policy;<br>• Agree to tariff levels before water service construction;<br>• Start charging tariffs upon initiating construction activities. |
| **Private sector participation in GAS strengthening, construction, operation, and maintenance** | • Develop and test a domestic private sector water service management model;<br>• Develop and test an alternative post-construction support model that involves private stakeholders;<br>• Involve the domestic private sector, NGOs, CBOs, and other private entities in relevant training, facilitation and capacity building efforts;<br>• Strengthen outsourcing, contract management and private sector at all levels, including appropriate enforcement and arbitration mechanisms;<br>• Design and implement a communications strategy surrounding the emerging role of the private sector;<br>• Strengthen regulatory mechanisms and regulatory enforcement to improve service quality and protect consumers. |
| **Decision-making at lowest level (decentralised decision-making)** | • Project implementation to be managed primarily at the municipal level;<br>• Tools and directives to be prepared to assist local governments in project implementation;<br>• On-going communications, capacity building and training directed at local governments and support organizations;<br>• Municipalities involved in information management both on the collection and receiving ends;<br>• MoGeCA post-construction support model instituted. |
| **Complementarity of water supply and sanitation** | • Projects prioritised in part based upon both water and sanitation needs;<br>• Participatory planning models piloted;<br>• Design and construction standards call for concurrent project execution;<br>• Coordination and planning among stakeholders for parallel implementation;<br>• Budget line items appear for both water supply and sanitation and hygiene. |
| **Use of appropriate** | • Policy needs to be developed, linked to subsidy levels and application of DRA; |

| PRINCIPLE | PROPOSED STRATEGIES |
|---|---|
| **technology** | • Projects should be appropriate to the local conditions, therefore solutions should not necessarily be 'one size fits all' but must consider the specific constraints of each site. |
| **User participation in all aspects of service delivery and provision** | • DRA, MoGeCA roll-out planning;<br>• Alternative O&M and post-construction support models developed;<br>• DRA methodology prepared & integrated into the NRWSSP. |
| **Human resource development is crucial** | • HRD strategic plans at all levels;<br>• Annual training plans prepared and implemented at all levels;<br>• Include domestic private sector, NGOs, CBOs, and user groups in HRD plans;<br>• Ensure permanent capacity building funding mechanisms;<br>• Support national training institute development, while utilising currently available alternatives such as IFAL. |
| **Source water protection** | • Include source water protection analysis and works, if needed, into each project design. |
| **Good governance** | • Equitable distribution of services implemented within and between communities;<br>• Gender mainstreaming policy and implementation;<br>• Policy and approaches designed and implemented for serving disabled and elderly;<br>• Policy devised and implemented for service delivery to the indigent, extreme poor, and other vulnerable households;<br>• Balance achieved in allocation of resources such that the needs of competing water users are addressed. |
| **Accountability and transparency** | • Requires institutional culture change, change management, new strategies, protocols, and tools;<br>• Institutionalisation of an annual sector review process led by MINEA/DNAAS;<br>• Tools devised and rolled-out for consumer complaint management. |

In terms of preparing the necessary conditions for implementing rural WASH, the NRWSSP proposes the following key interventions:

- preparation of a national rural water supply strategic plan;
- Immediate development and approval of national rural water supply and sanitation design and construction norms and standards;
- preparation of standard drawings and bills of quantity;
- expansion of the number of options for water service operations and management for use in the next generation of rural water services;
- advancement in the area of post-construction support to keep community-managed services viable; and,
- development of cost recovery guidelines.

Above and beyond the provision of improved access, services need to meet basic criteria of quality and sustainability. Achieving long-term functionality depends upon numerous factors, facilitated by the proposed programme interventions described below:

**Table D-3: Proposed Implementation Strategies for Achieving Service Sustainability**

| SUSTAINABILITY FACTOR | PROPOSED IMPLEMENTATION STRATEGY |
|---|---|
| ***Technical***<br>• Construction quality<br>• Appropriate technical options | • Immediate development and approval of national rural water supply and sanitation design standards, including standard drawings and bills of quantities;<br>• Obligatory provision of independent construction supervision for every infrastructure project, irrespective of its size;<br>• Application of DRA;<br>• Application of MoGeCA guidelines for community oversight of contractors;<br>• Technical training in alternative service solutions. |
| ***Social***<br>• Full community member participation | • Introduction of DRA including participatory planning;<br>• Development of a communications strategy aimed at informing beneficiaries, institutions, partners, etc of the objectives of the NRWSSP, legal and |

| SUSTAINABILITY FACTOR | PROPOSED IMPLEMENTATION STRATEGY |
|---|---|
| • Improved promotional efforts | institutional framework, scope, roles, responsibilities, etc.<br>• Design of appropriate instruments and processes for determining degree of user satisfaction;<br>• Introduction of improved methodologies for sanitation and hygiene promotion including sanitation marketing and modified STLC approaches (STLC+Hygiene, for example);<br>• Introduction of social equity approaches that include gender mainstreaming, and considerations for the elderly, disabled, indigent, and other vulnerable households. |
| ***Governance***<br>• Equitable distribution of services<br>• Accountability and transparency<br>• Gender responsiveness | • Provision of services to the lowest income groups, disenfranchised and minority groups;<br>• Transparency and fair procurement practices;<br>• Appropriate financial monitoring and evaluation;<br>• Downward accountability to *comunas* and beneficiary communities;<br>• Gender mainstreaming. |
| ***Financial***<br>• Cost recovery<br>• Cost control<br>• Economies of scale | • Immediate development of plans for national MoGeCA roll-out;<br>• Immediate preparation and promulgation of rural water supply subsidy, tariff, and fee policies;<br>• Review of PAT project costs and the subsequent preparation of benchmark CAPEX and OPEX levels for use as project selection and prioritisation criteria, and for tariff and subsidy-setting guidance;<br>• Achieve economies of scale by ensuring related factors are considered in design, contracting and construction. |
| ***Institutional and Legal***<br>• Post-construction support<br>• GAS functioning<br>• Institutional capacity built<br>• Performance and process monitoring identifies obstacles to sustainable service provision<br>• Availability of spare parts | • MoGeCA roll-out;<br>• Preparation of institutional capacity needs assessment among programme implementers;<br>• Development and implementation of institutional capacity building plans;<br>• Preparation of an alternative post-construction support model;<br>• Creation of an alternative service management model based upon public-private partnership, could include Design-Build-Operate schemes;<br>• Implementation of the programme's performance and process monitoring system;<br>• Incorporation of a spare part supply strategy into the post-construction support model. |
| ***Environmental***<br>• Source water protection and conservation | • Design a suite of diagnostic tools and interventions aimed at protecting the quality, quantity, and regime of all project water sources;<br>• Promotion of an open-defecation free environment. |
| ***Human Resources***<br>• Trained, incentivised and equipped human resources at all levels | • Preparation of human resource development capacity needs assessments at all levels and for all stakeholders;<br>• Development and initiation of training plans and programmes at all levels, for all stakeholders;<br>• Analysis of salary and benefit packages for public sector staff working in rural water supply and sanitation;<br>• Development of a suite of performance incentives, both financial and non-financial, for sector workers;<br>• Ensure permanent capacity building funding mechanisms. |