



**WES INFO BULLETIN**  
**NATIONAL ACTIVITY ALGERIA**  
**"CONDUCT A DIAGNOSIS FOR THE PERFORMANCE OF NON-REVENUE**  
**WATER (NRW) AND DEVELOP A PLAN FOR NRW IMPROVEMENTS**  
**FOCUSING ON THE MINIMUM COST OF INTERVENTIONS WITH FAST**  
**INVESTMENT PAYBACKS"**

January 2024

## Overview

From June 2020 to December 2023, the "Water and Environment Support (WES) in the ENI Southern Neighbourhood region" implemented a national project in Algeria "**Make an analysis of Non-Revenue Water (NRW) performance in a pilot public utility and develop a plan for NRW improvements focusing on minimum cost interventions with rapid return on investment**" (Activity: N-W-DZ-1), at the request of the Algerian government.

Despite Algeria's national policy to combat leakage and excessive water use, there has been enormous wastage of drinking water locally. The "Algérienne Des Eaux" (ADE) estimates average water losses between production and billing at 55%.

The **specific** objectives of this activity were:

- Assess the current situation of the network and analyse available data in the selected water utility's pilot area;
- Implement the sectorised metering zone (JSA) (delimitation of the sector) pilots and evaluate the NRW reference rate, apparent and physical losses and introduce a water evaluation procedure.
- Develop a wide range of rapid, cost-effective interventions in a JSA.
- **Strengthen the selected public service's capacity through direct participation in the implementation of tasks.**

## Methodology and Implementation

### □ Task 1: Launch phase

Task 1 included a **remote launch (June 11, 2020)**, followed by technical visits and identification of relevant stakeholders to be consulted as part of the activity. The pilot area was selected, and a group of referents (2 GIS and 2 NRW) was appointed, and their job profiles proposed. These referents were then involved in the activity throughout its implementation to ensure the transfer of know-how, training and learning by doing.

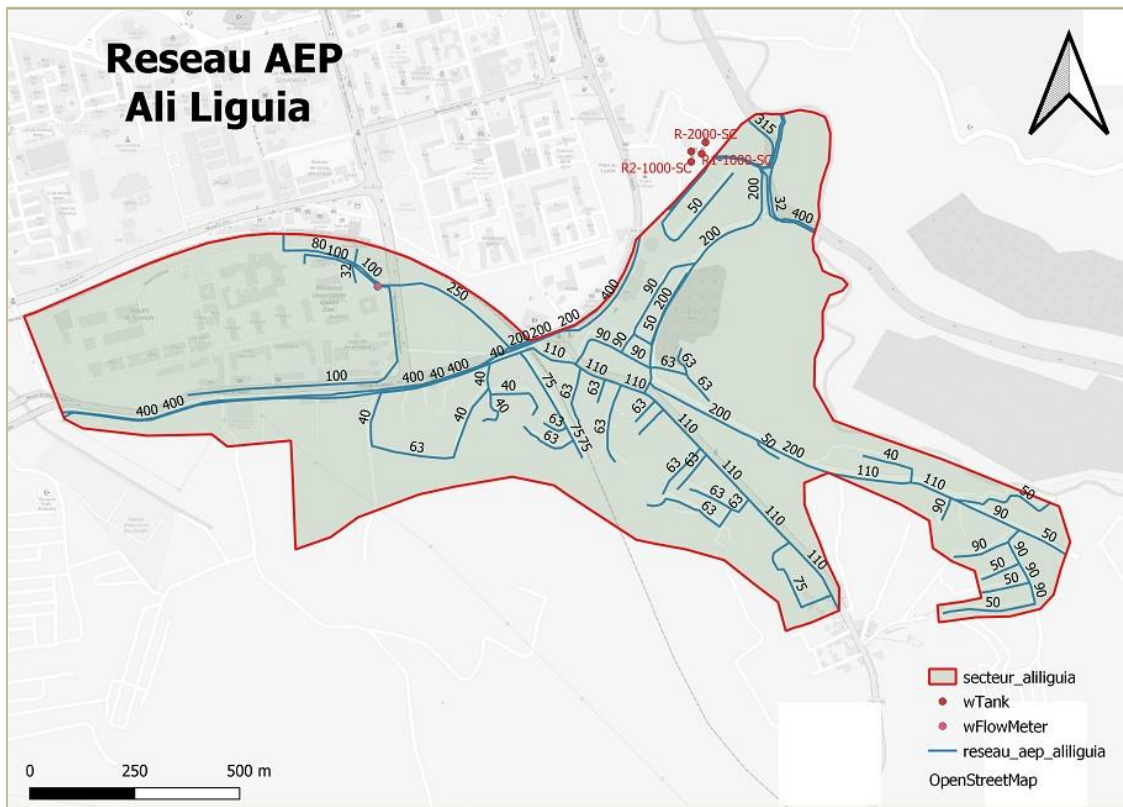
An assessment of the availability and reliability of "network and customer" data was also carried out. As a result, measures needed to complete the activity were proposed, including on-site network verification visits, the completion and updating of GIS data and digital mapping (GIS) of missing parts of the network and facilities. The launch phase culminated in the launch report and a half-day online workshop during which the results of this phase were presented to members of the partner team (NRW and GIS), along with the proposed job profiles.

### The selected pilot zone

ALI LIGUIA has been chosen as the pilot area. It belongs to the Boumerdes municipality, located 1 km South of the capital, Wilaya. . The criteria for selecting the pilot area included:

1. A single source of water
2. Easily identifiable boundaries within a reasonable sector size
3. A relatively new network (less than 10 years old), all rehabilitated in HDPE
4. Easily accessible from the ADE offices and near enough to the JSA entry point to allow the installation of a flow meter

FIGURE 1: BOUNDARIES OF THE SELECTED PILOT AREA



### □ Task 2: Collection of network and customer data

During this task, the data required to diagnose and evaluate non-revenue water was collected. The collection and evaluation of network and customer data concerns network components and customers, i.e. the length of the network, flows accounted for or invoiced, loss rates, volumes put into distribution, subscriber file, hydrological assessment, etc., which should be available and up to date. During this task, the data proved to be incomplete and in need of updating (in the case of the Ali Lighia study area) or non-existent - thus requiring investigations into the APC and hydraulics technical services, ground surveys to update the digital GIS mapping of networks, installations, customers and improving database structure. The task was completed by designing a data model to address the project's business issues and the delivery of the asset diagnostic report, including the GIS database for the pilot area and the data model.

### □ Task 3: Design the sectorised metering zone (JSA) and monitor the flow and pressure in this pilot zone

The area was chosen at the start of the project as being suitable because of its single water supply tower. Later, it was discovered that the network was more complicated than expected, with interconnections within sub-zones. This required the installation and operation of valves to ensure that the pilot zone was insulated. In addition, further work was required at the water tower to ensure that the correct supply line could be measured. The necessary work was carried out by ADE staff.

Limitations on system monitoring, shut down and analysis due to lack of water meant that only one period of flow and pressure monitoring was possible. **This was completed in May 2022.** The results of tasks 3 and 4 were presented in the report.

**Task 4: Calculate a hydrological assessment in the pilot JSA**

The pilot zone was identified as planned, insulated and prepared for measurement. Water-tightness was established and measurements were taken to determine pressure and flow rate. Domestic connections were surveyed, and the consumer database updated. **The measurement campaign was carried out in May 2022.** Tasks 3 and 4 were reported in a consolidated report submitted in October 2022. In this report, a hydrological assessment was presented, including results from the measurement campaign, data from the water meters and an analysis of the night-time flow.

TABLE 1: HYDROLOGICAL ASSESSMENT IN THE PILOT ZONE

Volume entering the system (corrected for known errors) = 15690	Authorised Consumption 401	Authorised consumption billed = 401	Metered and billed consumption (including exported water) = 368	Billed Water = 401
			Unmetered billed consumption = 33	
	Water losses = 1569-401 = 1168 = 521+647	Authorised consumption not billed = 0	Unbilled metered consumption Unknown, estimated at 0	Unbilled Water = 1168
			Unmetered consumption not billed Unknown, estimated at 0	
	Actual (physical) losses = 647 (from night-time flow calculation)	Apparent losses (commercial) = 521	Unauthorised consumption = Unknown, Estimated at 497 m <sup>3</sup> /day	
			Counting inaccuracies at user level = 24, calculated from table 4.6	
		Leaks in water transmission and/or distribution mains		
		Leaks in service connections downstream of the domestic water meter		
		Leaks and overflows at water supply companies, particularly water towers		

Based on the above calculations, total non-revenue water (excluding financial losses) is around 74%.

**Task 5: Prepare the NRW reduction action plan for the pilot JSA**

The action plan to reduce NRW in the pilot area was developed to include activities to reduce seven different components of water loss. The plan was divided into short, medium, and long-term phases, mainly associated with intervention cost. The focus was on low-cost, high-return activities to reduce losses. This action plan was discussed at the **national workshop in March 2023 in Algiers.** The action plan was split into two parts; the first part involved improving data and, therefore, the final analysis of the pilot area; the second part focused on the physical steps needed to control and reduce NRW in the area. During the discussion, participants were enthusiastic about the pilot project and satisfied with the approach and its results.

**The ADE expressed its wish to adopt measures insofar as a new pilot project is envisaged, under ADE management. An additional action plan was prepared for this second pilot zone.**

**Task 6: NRW and GIS training**

**NRW training**

In the interests of the Boumerdes ADE unit, a partner in the project, structured and practical training has been provided for staff involved in the management of non-revenue water, in particular the NRW partner team, which was set up at the start of the project. Training included the management of non-revenue water, analysis of field data, the concept of minimum night-time flow, methodology and examples for

setting up a sectorised metering zone and ensuring its perfect insulation, hydrological assessments, basic NRW assessments, and real and apparent losses. Training was implemented through theoretical and practical exercises.

### **GIS training**

To ensure that GIS referents can undertake their planned tasks and manage the GIS tool, the GIS referents were trained from the ground up in the basic concepts of GIS. They were appointed as part of the project and have never worked with GIS before and do not have the necessary skills to manage a GIS database, including handling GIS and database software. In addition, weekly work sessions allowed them to perfect their knowledge of GIS.

GIS training thus included the handling of GIS software and geographical data (integration, updating and dissemination of geographical data and exploitation of NRW data, etc.).

## **Achievements**

The main results were as follows:

### **Non-Revenue Water (NRW)**

- A pilot area demonstrating NRW measurement techniques has been set up.
- Data collection was carried out in the pilot area, including the collection of consumer data, mapping and water use.
- Data was collected regarding water entering the network and sold to consumers, including field surveys to validate the data collected, particularly network components (e.g. position of valves, meters, etc.).
- Night-time flow measurements were carried out to establish physical reference losses.
- Using a top-down and bottom-up approach, an acceptable hydrological assessment was prepared.
- An action plan for the future reduction of NRW has been prepared.
- A second action plan to replicate the activities carried out in the first pilot zone has been prepared.
- Proposals were made for setting up a NRW team within the ADE Béjaia unit (including the composition of the team, their qualifications, job profiles and roles).

### **GIS**

- A review of existing GIS data was carried out.
- Recommendations for a transition to OpenSource (QGIS) have been made.
- A training program using QGIS was prepared, and the course was delivered (online and hands-on).
- A data model for future data entry has been prepared.
- GIS data for the pilot area has been updated.
- QFIELD was demonstrated and used to update the location of consumer meters used in NRW activities.
- A proposal was made to set up a GIS team within the ADE Béjaia unit, and to organize a GIS unit or entity that meets international standards.

## Main Outcomes

- ✓ The project was completed in accordance with guidelines, despite some delays. These difficulties are mainly due to the fact that the project started during COVID restrictions, which meant that fieldwork and NRW and GIS expert missions had to be postponed.
- ✓ Thanks to the implementation of the activity, the current NRW situation is well understood for the pilot area. The general and specific objectives of the activity have been achieved, to the extent that the benefits of NRW control and management are very clear and local partners wish to extend these activities to other regions. Indeed, partners have shown great enthusiasm for extending the experiment to other areas within the ADE and have undertaken several short term, low-cost measures aimed at reducing non-revenue water (NRW) in the Ali Lighia pilot area (improvement of data and NRW control) and extending activities to other areas. Action plans are already in place to continue to monitor and control NRW levels, and to strengthen support services such as GIS.
- ✓ The implementation of proposed institutional changes/reforms is now in the hands of ADE Bejaia, while the WES's involvement ends here. To carry out the actions recommended in the activity good management is required, as well as leadership focused on the overall reduction of non-revenue water. To ensure that processes are implemented, certain structures, such as internal teams and management, may need to be modified. Work processes may need to be changed or adapted. Financial contribution may also be required to support operational processes, technological platforms, and their integration. Often, within a unit such as ADE, team structures are in place for billing, for example, leak detection and repair, or monitoring.
- ✓ An integrated approach across all executive operations is required to achieve a positive outcome, which may require different management structures with authority across teams and marketing branches. All the measures proposed in the action plan must always be specific to ensure that progress in one area is not cancelled out by a lack of improvement in another.
- ✓ Since the activity concerns many other ADE areas throughout Algeria, all with the same high NRW problem, we firmly believe that the full involvement of concerned staff in the pilot zone activity, as well as on-site ADE staff training, will subsequently enable them to transfer their know-how to other areas served by the ADE.



### Useful Link

[https://www.wes-med.eu/activities\\_type/n-w-dz-1-conduct-a-diagnosis-for-the-performance-of-non-revenue-water-nrw-in-a-pilot-utility/](https://www.wes-med.eu/activities_type/n-w-dz-1-conduct-a-diagnosis-for-the-performance-of-non-revenue-water-nrw-in-a-pilot-utility/)

## WES Project

The EU funded Water and Environment Support (WES) is a regional project designed to contribute to the implementation of an integrated approach to pollution reduction and prevention, in line with the Union for the Mediterranean agendas and the Barcelona Convention. WES is also meant to contribute to a more efficient management of scarce water resources in the ENI Southern Neighbourhood region.

The project aims to do so by increasing the capacity of stakeholders that are involved in pollution reduction and water management and support them in formulating and implementing the environmental and water policies.

WES supports the shift to a more sustainable consumption and production model, promotes an integrated and efficient management of water, combats plastic pollution and marine litter and fosters dialogue on key environmental and sustainable development issues. In this way, WES also supports mutual understanding, cooperation, and peace in the region.

For any further information on WES project, please visit: [www.wes-med.eu](http://www.wes-med.eu)

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