

advanced solutions for

A Dynamic Approach
To Enhance
Living Environment

sewerage networks

ready for the resource revolution



suez

challenging conventional approaches for innovative sewerage systems

TODAY, WATER POLLUTION DUE TO EFFLUENT DISCHARGE IS A MAJOR CONCERN*:



of sewage is discharged untreated & directly into natural water bodies in developing countries

of industrial effluents are dumped untreated into natural water bodies in developing countries

of polluted stormwater is discharged into rivers & beaches

on average is lost every year due to floods

There are **two main types of sewerage systems**. **Combined systems** discharge some or all of surface water into the foul water drainage system, while **separate systems** always keep them dissociate. Even if the principles of collection are different, **operational standards remain the same**.

Performance is a **technological**, and thus **critical** factor in choosing a preferred form of sewer management. Meeting the wastewater and stormwater challenge is a **transformative act** that is able to enhance **people's living conditions** and foster **cities' resilience**.

In a context of accrued **sustainability**, **transparency**, **environmental protection**, and related **regulations**, sewer and drainage networks should be considered within the full water cycle, and **managed in a responsible, more durable and efficient way**.

That's why SUEZ developed **ADVANCED SOLUTIONS FOR SEWERAGE NETWORKS**.



* U.S. Environmental Protection Agency, UN Water, OECD



advanced solutions to achieve your goals

IMPROVE SERVICE QUALITY & ENHANCE YOUR CITY'S RESILIENCE

- ▶ **Guarantee** service through sustainable operation and maintenance of your network
- ▶ **Limit** rainfall events' impact on the economy, daily life and safety
- ▶ **Prevent** emergency situations
- ▶ **Increase** transparency among stakeholders

REDUCE EXPENDITURES, OPTIMIZE YOUR ASSETS & RELATED INVESTMENT

- ▶ **Lower** your operational expenditures
- ▶ **Extend** the lifespan of your network with optimized operations and proactive maintenance
- ▶ **Minimize** the construction of additional facilities

PROTECT THE ENVIRONMENT

- ▶ **Minimize** pollutant discharge effects
- ▶ **Preserve** receiving water bodies and biodiversity
- ▶ **Comply** with environmental standards
- ▶ **Avoid** sanitary risk
- ▶ **Reduce** energy consumption

a dynamic approach to enhance living environment

ADVANCED SOLUTIONS FOR SEWERAGE NETWORKS:
Manage your sewerage system performance with an integrated solution from a world-class operator

Based on decades of **operational experience**, SUEZ has developed a suite of 5 **flexible and complementary solutions**. Our service offer can be **customized** to meet your objectives.

ASSESSMENT

DIAGNOSIS & STRATEGY
Operational and performance assessment to define a Master Plan

IMPLEMENTATION & OPERATION

NETWORK MANAGEMENT
Predictive tools to alert, anticipate and optimize sewerage operations in dry and wet weather

INFLOW MANAGEMENT
Inflow and infiltration assessment, monitoring and treatment to improve system capacity

ASSET MANAGEMENT
Design, construction and sustainable operation of infrastructure

ENVIRONMENTAL PROTECTION
Real-time monitoring and management of receiving water quality, and nuisances

KNOW-HOW TRANSFER
Operational expertise available to local staff

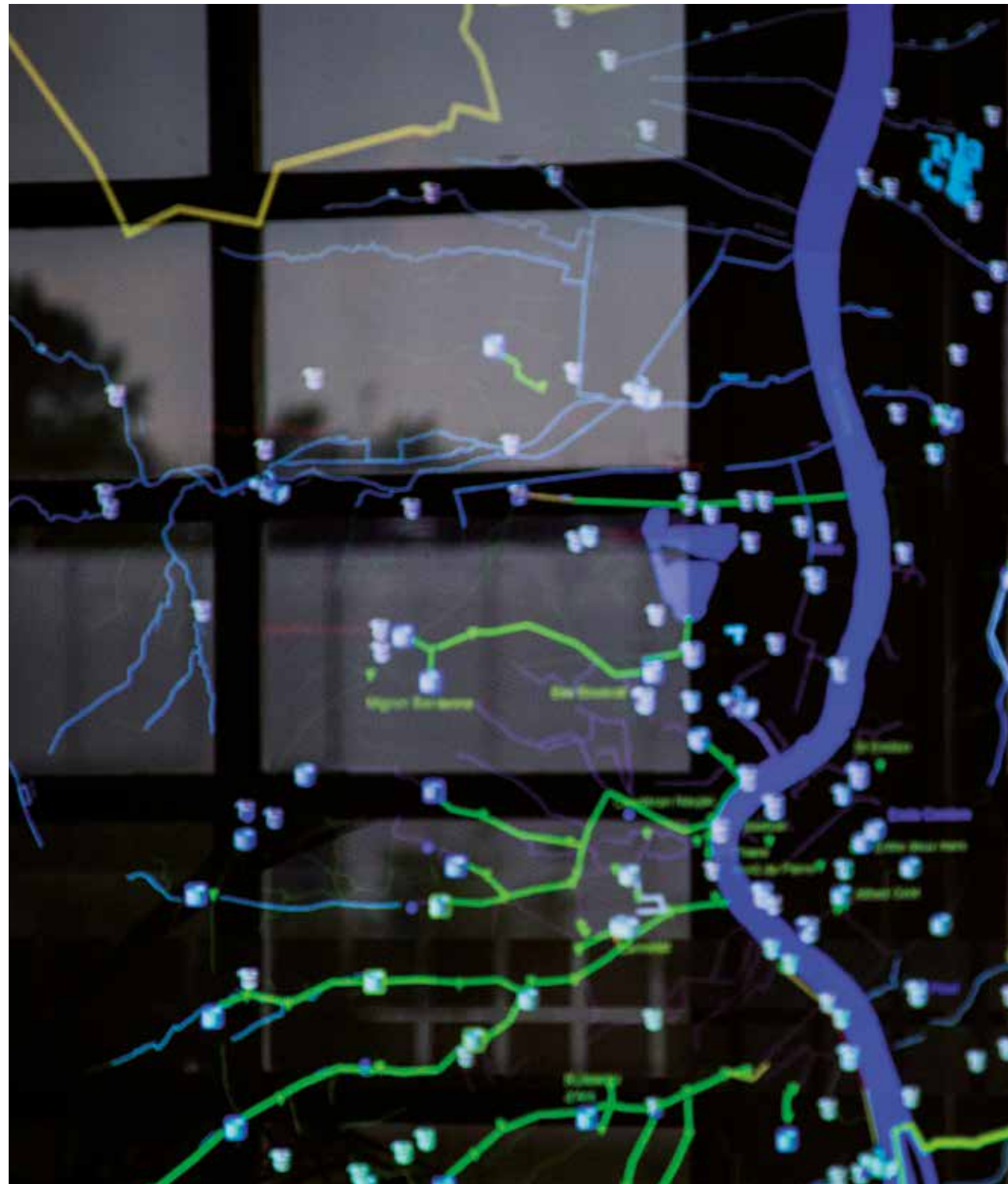
A DYNAMIC APPROACH TO ENHANCE LIVING ENVIRONMENT

AQUADVANCED® Urban Drainage

INTEGRATED SEWER AND STORMWATER
SYSTEM MANAGEMENT SOFTWARE

AQUADVANCED® Urban Drainage is a **global decision making software** ensuring optimal and transparent management of sewerage systems –from network operations, monitoring and weather forecasting to environmental protection and hydraulic control–through:

- ▶ **Detailed and continuous overview** of your infrastructure and geographical follow-up of network operations
- ▶ **Energy monitoring**
- ▶ **Alerts and analytics** to help operator decide and minimize risk during crisis situations
- ▶ **Weather forecast with real-time calculation of rainfall impact** on sewerage system, city and receiving waters
- ▶ **Optimized management strategies** to ensure the best use of storage capacities while preventing flooding and polluted overflows



+
our
operational
expertise
means you
benefit from:

- ▶ An **integrated approach** coupled with 130 years of experience in water management and day-to-day operation
- ▶ A **wide range of tools** and their tailored implementation taking into account your local conditions
- ▶ **Cutting-edge technologies**
- ▶ Our ability in **crisis management**
- ▶ Our proven ability to **transfer knowledge** to your team
- ▶ Our experience in **coordinating** the utility's different units (management, technical and financial)

DIAGNOSIS & STRATEGY

build a master plan for active sewerage management

6 SUEZ's proven methodology helps better understand and evaluate your existing infrastructure in terms of efficiency, operation and crisis management in order to define a dedicated Master Plan

OPERATIONAL & PERFORMANCE INFRASTRUCTURE ASSESSMENT

- **Understand** the local context and **assess** the existing system performance
- **Acquire** knowledge on flows and pollution by conducting an operational review through GIS analysis, hydrologic and hydraulic modeling
- **Evaluate** vulnerabilities, risk of flooding, and environmental impact
- **Conduct** a structural audit on all the collection components

STRATEGIC MASTER PLAN

- **Design** network, equipment and storage infrastructure to regulate flows, solve hydraulic failures, and reduce environmental impacts
- **Anticipate** and **respond** to climate events
- **Optimize** network performance, storage and discharge
- **Capitalize** on SUEZ's experience with specific technical assistance adapted to your needs
- **Define** a Master Plan to achieve a high return on investment and optimize both CAPEX and OPEX

PROJECT MANAGEMENT

- **Benefit** from our technical and managerial expertise to ensure the effective implementation of the Master Plan
- **Monitor** the results through Key Performance Indicators
- **Synchronize** actions with urban planning
- **Steer governance** across project implementation



BENEFITS

- **Prioritize** actions to be taken
- **Increase** profitability
- **Enhance** response capabilities
- **Monitor** your system performance
- **Support** urban planning

REFERENCES



SANTIAGO DE CHILE - CHILE

10,554_{KM}

of sewerage network modeled through innovative software

- Quantitative and qualitative simulation of **network and WWTP functioning**
- Simulation of **urban surface water flow and sewerage discharge impact** on the receiving water body

CASABLANCA - MOROCCO

5,300_{KM}

of sewerage network modeled

- Analysis of **network operational issues** in dry and wet weather
- Analysis of **recurring flood issues** due to urban runoff
- Definition of a **Master Plan** including major infrastructure works

NETWORK MANAGEMENT

activate your network for real-time operations

SUEZ's solution increases network capacity and reduces risk of overflows by anticipating and managing events in real time

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SMART EQUIPMENT FOR ACTIVE MANAGEMENT

- ▶ **Benefit** from high quality data transmission by installing advanced level, flow and quality sensors
- ▶ **Turn** your system into an active infrastructure powered by AQUADVANCED® Urban Drainage, to optimize network storage capacity and behavior (valves, pumps, gates)

REAL-TIME SEWER MONITORING & EARLY WARNING

- ▶ **Monitor** hydraulic and environmental performance of sewer network and stormwater infrastructures
- ▶ **Follow-up** day-to-day network maintenance operations and energy consumption through Key Performance Indicators
- ▶ **Anticipate** flooding, overflows and pollution risk using weather forecasting, and real-time modeling tools

SMART NETWORK OPERATIONS

- ▶ **React** efficiently to storm and pollution events by managing hydraulic operations, storage, and treatment plants in real time
- ▶ **Maximize** the system's available storage capacity, thus reducing related investment
- ▶ **Implement** a control plan, while complying with regulatory standards

AQUADVANCED® Urban Drainage INTEGRATED SEWER & STORMWATER SYSTEM MANAGEMENT SOFTWARE

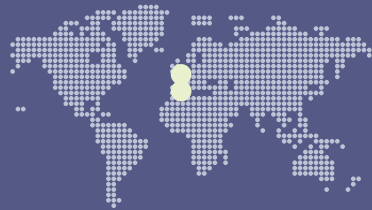
- ▶ **Monitoring Module:** Follows-up hydraulic network operations and quality of receiving waters in real time thanks to a comprehensive dashboard
- ▶ **Early Warning Module:** Predicts flood and pollution risk
- ▶ **Advanced Control Module:** Enables optimized control and automatic operation of the system



BENEFITS

- ▶ **Prevent** flooding, overflows and pollution risk
- ▶ **Reduce** reaction time to events
- ▶ **Lower** investment
- ▶ **Increase** storage and treatment capacities
- ▶ **Comply** with regulatory standards

REFERENCES



BORDEAUX - FRANCE

2,100_{KM}

of network operated
using smart equipment

- ▶ More than **4,000** parameters monitored in real time
- ▶ **300** significant rain events anticipated and managed

BARCELONA METROPOLITAN AREA – SPAIN

+ 3_{MILLION}

people served in 36 municipalities

- ▶ **300 km** of interceptors
- ▶ **33** pumping stations and **7** WWTPs
- ▶ **10** municipal sewerage systems with advanced infrastructure

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INFLOW MANAGEMENT

make the most of your system capacity

SUEZ's solution enables comprehensive management of inflows to secure system capacity and water treatment

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INFLOW/INFILTRATION MANAGEMENT

- **Locate** and **evaluate** the extent of inflow and infiltration through data collection and treatment, measurement campaigns in dry and wet weather, and inspections
- **Implement** a structural assessment of the network to avoid failures caused by geotechnical disruptions or sealing issues due to infiltration
- **Set up** inflow/infiltration zoning, and implement a multiannual action plan to better manage assets and connections

DOMESTIC & PUBLIC CONNECTIONS MANAGEMENT

- **Minimize** inflow/infiltration volumes by implementing the right design, construction and repair processes with new operational tools
- **Drive** inspection campaigns on connections (smoke pattern tests, colorant control, etc.)
- **Benefit** from building permits consulting services to prevent inadequate inflow

INDUSTRIAL DISCHARGE MANAGEMENT

- **Identify** and **inventory** potential sources of industrial pollution
- **Receive** methodological support on waterway discharge agreements
- **Define** a quality control plan and **drive** it through monitoring, and laboratory analysis
- **Benefit** from comprehensive legal and regulatory assessment to process fines, discharge authorizations, etc.

DIAGRAP SEWERAGE NETWORK INSPECTION TOOL

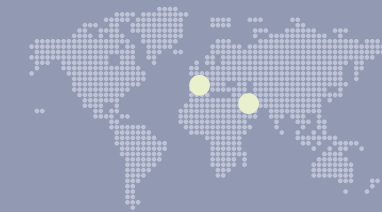
- Provides fast structural assessment of network condition thanks to pole cameras
- Procures GIS-based notation of pipe defaults
- Brings support to detailed CCTV investigation or renewal plans



BENEFITS

- **Improve** system capacity
- **Reduce** energy consumption
- **Extend** your facilities' lifespan
- **Optimize** investment
- **Preserve** surroundings

REFERENCES



BORDEAUX - FRANCE

131,000 ^{m³/DAY}
on average of inflow/infiltration

- **20 to 40,000 m³/day** of inflow/infiltration corresponding to piped stream
- Implementation of smoke pattern tests on **19,000** connections

DOHA - QATAR

180,000 ^{m³/DAY}
WWTP managed

- Support to field investigations and **long-term strategy** to deal with industrial connections

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ASSET MANAGEMENT

shape innovative techniques for greater system reliability

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SUEZ's solution prioritizes innovative techniques for sewerage network rehabilitation and maintenance to optimize efficiency and investment

NETWORK CONDITION ASSESSMENT & INVESTMENT

- ▶ **Evaluate** network structural and functional conditions through assessment and inspections
- ▶ **Build-up** an inventory of network and electromechanical assets
- ▶ **Design** and **plan** new equipment and storage infrastructure to regulate flows, and limit network vulnerability
- ▶ **Establish** an annual cost-effective rehabilitation plan to optimize works, and better manage investment

NETWORK MAINTENANCE

- ▶ **Benefit** from innovative inspection and cleaning solutions adapted to your network needs
- ▶ **Implement** innovative, predictive and preventive maintenance of electromechanical assets to improve performance, reduce costs, and avoid failure risk
- ▶ **Increase** data traceability when inspecting confined spaces and reduce operational risk thanks to drones
- ▶ **Monitor** hydraulic and quality performance of infrastructures regarding overflow, pumping efficiency, inflow, and infiltration
- ▶ **Manage** black spots to lower risk related to hydrogen sulphide in anaerobic conditions and **avoid** odors

NETWORK REHABILITATION

- ▶ **Select** the most adapted materials and techniques to renew your network while minimizing the impact on the surrounding environment
- ▶ **Train** field teams to guarantee high quality work

GALIA ADVANCED OPERATION & MAINTENANCE

- ▶ Provides comprehensive knowledge of network real state, operations performed and results
- ▶ Determines where, when and how often cleaning is necessary
- ▶ Provides a choice of the most appropriate resources for each requirement

AQUADVANCED®
Urban
Drainage
COMPATIBLE



BENEFITS

- ▶ **Lower** operational costs
- ▶ **Optimize** treatment and storage capacities
- ▶ **Limit** your investment
- ▶ **Extend** your facilities' lifespan
- ▶ **Avoid** odors and **reduce** nuisances

REFERENCES



NASSAU COUNTY (NEW YORK) – USA

+30%

of productivity gained by optimizing cleaning and inspection scheduling

- ▶ **400 km** of Innovative Acoustic Inspections (SL-RAT)
- ▶ **200 km** of Pole Camera and CCTV inspections

ALICANTE - SPAIN

-33%

on preventive maintenance costs while preserving quality of service

- ▶ Annual investment on network rehabilitation reduced by **20%**
- ▶ Annual breakage rate reduced by **2.5%**
- ▶ Network lifespan enhanced by **15%**

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ENVIRONMENTAL PROTECTION

monitor quality, tackle nuisances & promote transparency

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SUEZ's solution forecasts risk to efficiently enhance the quality of receiving water and people's living conditions

ASSESSMENT & IMPLEMENTATION OF RECEIVING WATER MONITORING SYSTEM

- **Evaluate** quality of the receiving water in real-time and **forecast** pollution risk thanks to predictive models
- **Determine** the best sensor equipment and placement through site expertise
- **Identify** monitoring parameters and the right type of facility to be installed

RECEIVING WATER QUALITY MANAGEMENT

- **Monitor** quality of the receiving water in real-time
- **Increase** transparency by sharing information with stakeholders and citizens
- **Protect** sea and fluvial environments in order to comply with regulatory standards
- **Support** authorities in managing beach, lake and river closures/re-openings, and **alert** in case of water quality degradation

NUISANCES MANAGEMENT

- **Monitor** system nuisances and **identify** critical areas
- **Assess, prevent and treat** odors thanks to in-house comprehensive methodology (NOSE)
- **Reduce** the impact of works and interventions on population, and **improve** safety

COWAMA COASTAL WATER MANAGEMENT

- Continuously measures relevant parameters through Sirene® sensors
- Monitors in real time the state of natural water bodies in discharge situations
- Forecasts bathing water quality
- Alerts public authorities and citizens
- Enables the implementation of comprehensive dashboards and apps, such as iBeach®

AQUADVANCED®
Urban
Drainage
COMPATIBLE



BENEFITS

- **Limit** pollution risk
- **Protect** people and property
- **Reinforce** territory attractiveness
- **Enhance** transparency
- **Comply** with regulatory standards
- **Optimize** environmental protection investment
- **Preserve** resources and **promote** biodiversity

REFERENCES



ALGIERS – ALGERIA

+32

beaches reopened since 2006

- **63** combined sewer overflows monitored
- **2/3** of pumping stations rehabilitated
- **95%** of connected households

ALICANTE – SPAIN

-95%

of polluted discharge to receiving water during storm events

- **29** discharge points monitored, impact modeling and early warning
- **24** rain gauges and **51** level gauges installed
- Stormwater retention tank of **60,000 m³**

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tracking map

01 **DIAGNOSIS & STRATEGY** OPERATIONAL AND PERFORMANCE ASSESSMENT TO DEFINE A MASTER PLAN

- Operational & performance infrastructure assessment
- Strategic Master Plan
- Project management

02 **NETWORK MANAGEMENT** PREDICTIVE TOOLS TO ALERT, ANTICIPATE AND OPTIMIZE SEWERAGE OPERATIONS IN DRY AND WET WEATHER

- Smart equipment for active management
- Real-time sewer monitoring & early warning
- Smart network operations

03 **INFLOW MANAGEMENT** INFLOW AND INFILTRATION ASSESSMENT, MONITORING AND TREATMENT TO IMPROVE SYSTEM CAPACITY

- Inflow/infiltration management
- Domestic & public connections management
- Industrial discharge management

04 **ASSET MANAGEMENT** DESIGN, CONSTRUCTION AND SUSTAINABLE OPERATION OF INFRASTRUCTURES

- Network condition assessment & investment
- Network maintenance
- Network rehabilitation

05 **ENVIRONMENTAL PROTECTION** REAL-TIME MONITORING AND MANAGEMENT OF RECEIVING WATER QUALITY, AND NUISANCES

- Assessment & implementation of receiving water monitoring system
- Receiving water quality management
- Nuisances management

know-how transfer sharing our expertise

SUEZ makes all of its operational expertise and know-how available to local staff

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For years, SUEZ's worldwide research and technical centers have been pooling their water cycle expertise. Supported by the Group's expert networks and our track record of successful implementations, SUEZ has developed an innovative and comprehensive approach for transferring know-how to local operations.

SUEZ helps you achieve high degree of institutional competency and full autonomy.

In accordance with your specific needs, we address the elementary core business processes and help water operations improve their efficiency. We assist you in defining, implementing and monitoring tailor-made action plans for the effective transfer of knowledge to your local staff.



BENEFITS

- ▶ **Achieve** a high degree of institutional competency and full autonomy
- ▶ **Transfer** relevant know-how and expertise to local staff
- ▶ **Improve** operational efficiency

REFERENCES

- 400** researchers and experts across the world
- ▶ **6** research centers and over **65** research programs
- ▶ More than **120** research partners



SUEZ key figures

A GLOBAL LEADER IN WATER AND WASTE MANAGEMENT SERVICES

OPERATING IN MORE THAN 70 COUNTRIES ON 5 CONTINENTS



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a unique profile

- ▶ Operator
- ▶ Customized & innovative solutions developer
- ▶ Solution integrator

they trust us

Paris, Bordeaux, Dijon (France), Barcelona, Alicante, Murcia (Spain), Bristol (UK), Casablanca (Morocco), Algiers, Oran (Algeria), Jeddah (Saudi Arabia), Doha (Qatar), Santiago (Chile), Macau, Chongqing (China), New Delhi, Mumbai (India), Adelaide, Perth (Australia), New York (USA), Cartagena (Colombia)

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