Requirements Document: Water LLM – Leak Detection in Water Networks

# 1. Document Control

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| Project Name | Water LLM – Water Networks & Distribution |
| Use Case Name | Leak Detection |
| Prepared By | Business Analyst, TCS |
| Date | July 21, 2025 |
| Version | 1.0 |
| Reviewed By | Solution Architect, GenAI Engineering Team |

# 2. Purpose

This document captures the functional and non-functional requirements for implementing Leak Detection using GenAI within the Water LLM Engine. The objective is to proactively detect potential leaks using real-time and historical pressure and flow data, reducing non-revenue water and infrastructure damage.

# 3. Scope

- Applicable for urban and rural water distribution networks  
- Monitors real-time sensor inputs from pressure and flow meters  
- Supports predictive and anomaly-based leak identification  
- Integrates with SCADA, GIS, and Work Order systems  
- Delivers GenAI summaries and recommendations

# 4. Actors & Stakeholders

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| Actor | Role & Responsibility |
| Field Engineer | Acts on leak alerts, verifies leaks on-ground |
| SCADA Operator | Monitors alerts in real-time, validates sensor health |
| Water LLM Engine | Processes sensor data, generates GenAI insights |
| Leak Detection Model | AI/ML model predicting leak probabilities |
| Supervisor / Manager | Approves field actions, reviews summaries |
| GIS System | Maps pipe segments and sensor zones |
| Work Order System | Issues and tracks maintenance tickets |