User Guide: Water LLM Engine with Contextual Advisory

What This System Does

This system continuously monitors weather and sensor data to predict risks and manage overflow situations. It does this by:

- Reading rainfall and tank fill data
- Predicting if an overflow might happen
- Suggesting actions to reduce the risk
- Automatically sending commands to pumps or valves
- Generating compliance reports and alerts for operators
- Giving AI-based advice on what to do

How It Works

1. Weather Monitoring: Connects to a weather API to check rainfall.
2. Sensor Readings: Checks tank levels and inflow rates.
3. Risk Calculation: Determines risk level (LOW, MEDIUM, HIGH).
4. Overflow Control: Sends control commands (e.g., open valve).
5. Compliance & Logs: Generates reports for regulators.
6. AI Guidance: Gives natural language advice on next steps.
7. Tank Load Balancing: Adjusts loads between tanks.
8. Storm Coordination: Takes action across all systems during storms.

What You Need to Setup

- Integration configuration with SCADA/MQTT/OPCUA/PLC info
- Weather API key and endpoint
- Sensor endpoint to read tank data
- Asset and river configuration in CSV files

Common Functions (No Code Needed!)

- Storm Response: Automatically runs when triggered by the user or system.
- Overflow Control: Uses real data to prevent flooding.
- Tank Load Balancer: Makes sure all tanks are evenly used.
- Compare Predictions: Checks if AI predictions match real events.
- Generate Reports: Prepares compliance reports for regulatory bodies.

Input Files & Data

- integration.db: stores API and system config
- asset_config.csv: defines expected readings for pumps/valves
- tank_config.csv: stores tank size and zone info
- river_impact_config.csv: zones and their river risk level

Smart AI Suggestions

The engine uses GPT-4 to give friendly, plain-English suggestions based on real data. For example: "If rainfall is high and tanks are almost full, open all valves and alert the field team."

Summary

This engine automates overflow management, ensures regulatory compliance, balances tanks, and keeps water infrastructure safe all powered by AI and real-time data.