NexAi

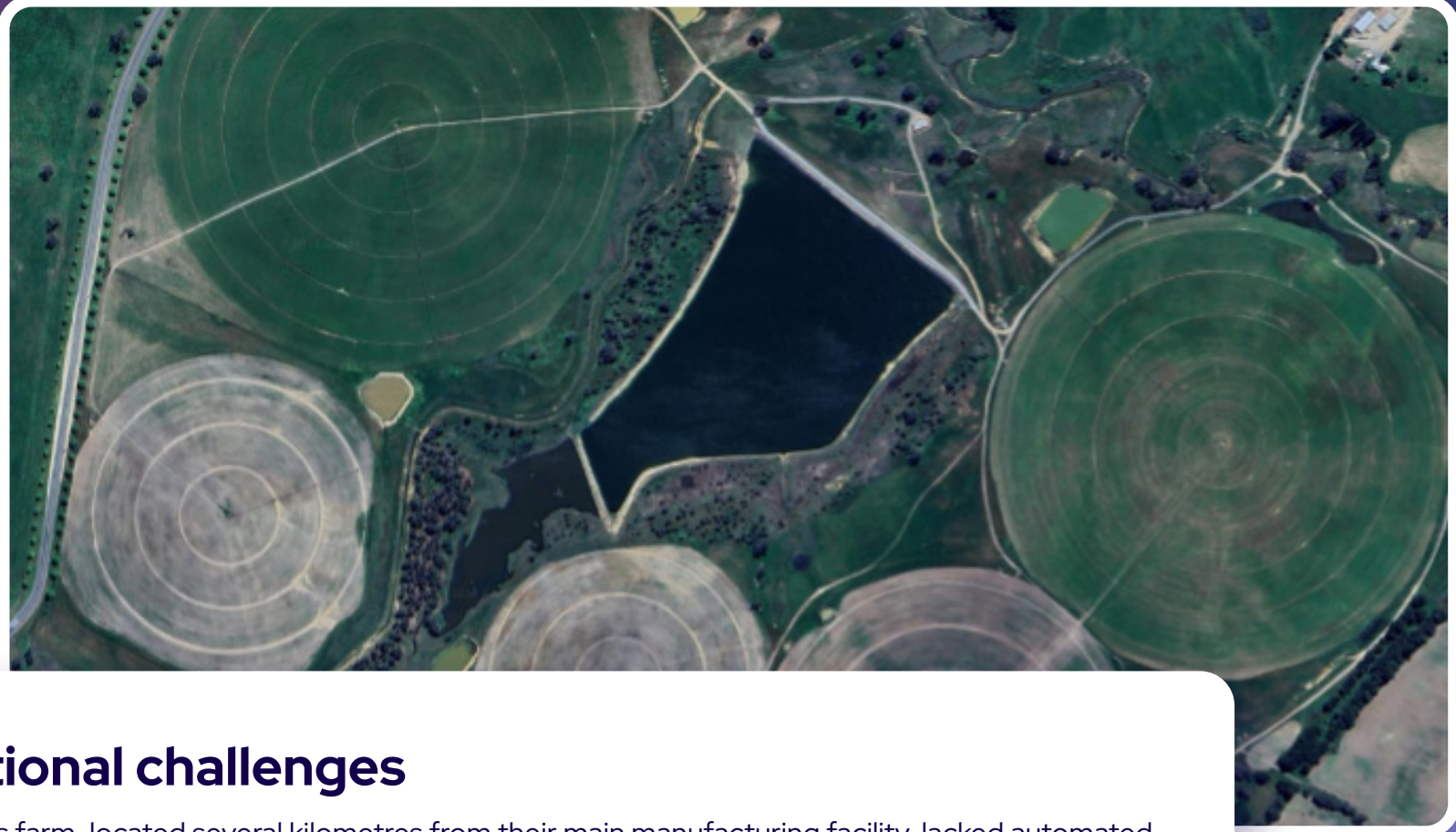
Smart farm management

CapitalAi

Customer Problem

An established NexAI customer manages a complex water system that includes a 2.5 megaliter (ML) storage dam and 90 hectares (ha) of irrigated agricultural land. This system supports the processing of surplus water from their paper manufacturing facility. The client must maintain precise control over the dam levels to ensure adequate surge capacity for the manufacturing plant and to secure seasonal water availability for crop irrigation.

The agricultural operation involves five fields, each irrigated by centre-pivot systems. The water released for irrigation must be monitored and reported to the Environmental Protection Agency (EPA) to comply with regulatory requirements. Over-irrigation, which can result in runoff into nearby catchment areas, poses a significant risk, as it is subject to stringent environmental regulations.



Additional challenges

The client's farm, located several kilometres from their main manufacturing facility, lacked automated monitoring and control for its water management systems. Pumps and centre-pivot irrigators were manually operated by push button controls, with dam levels recorded by hand. This manual approach led to inefficiencies, including runoff incidents due to the continuous irrigation of the same land, as there were no interlocks between the pumps and pivots.

CapitalAI Solution

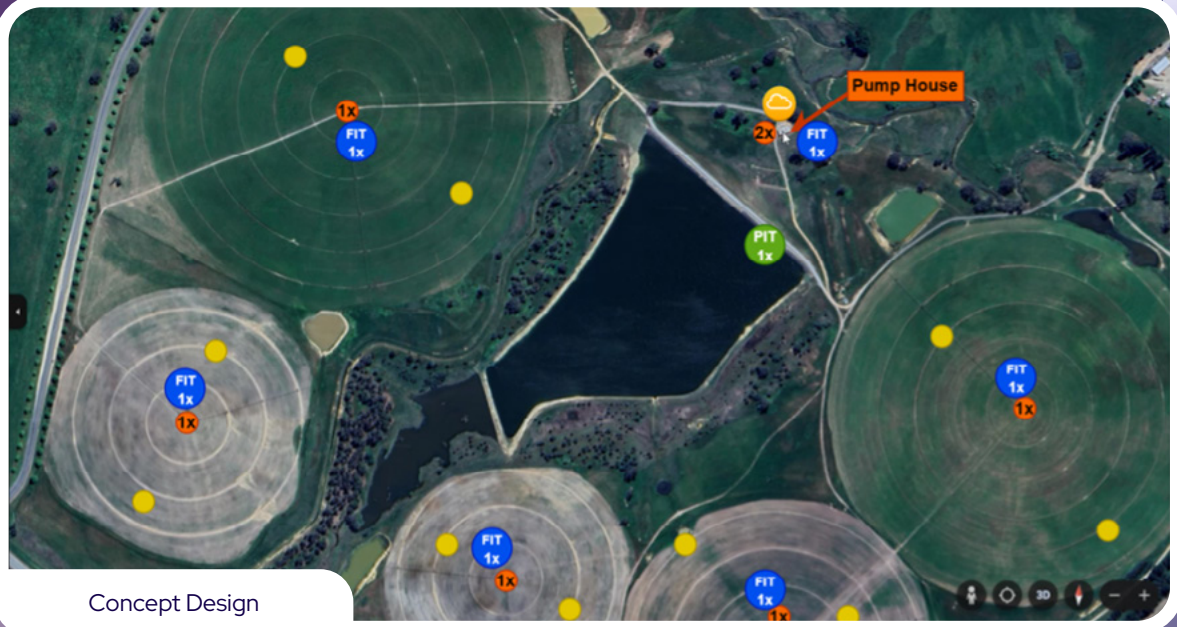
The CapitalAI team consulted with the client to understand the important monitoring and control requirements and reportable metrics and implementation options:

- Measurement of total water volume discharged from plant
- Monitoring of dam levels, and volumetric capacity
- Monitoring of irrigation volumes delivered at each pivot (monthly totals reportable to the EPA)
- Remote Start/Stop capability for main pumps, and interlocking pump running with pivot running.
- Monitoring electricity consumption of the pump and pivot infrastructure.
- Monitoring field soil moisture at multiple locations and depths.
- No existing fieldbus or controls infrastructure, and due to the distances involved, cable runs would be prohibitively expensive.

High Level Design

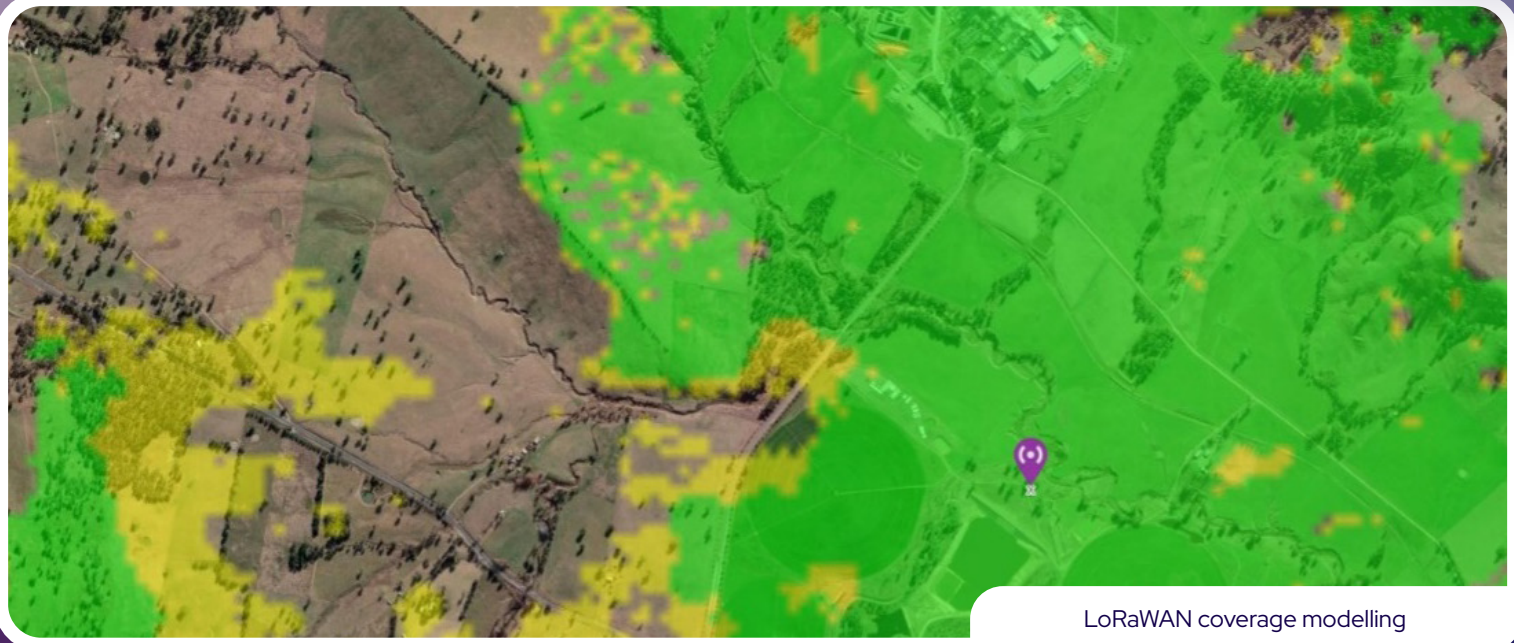
A private LoRaWAN based solution was designed using Milesight UC series IoT Controllers, Milesight UG67 Gateway with 4G backhaul. Power monitoring was provided by a Modbus based 3-Phase Power monitor, (integrated by the IoT controllers), and submersible pressure transmitter was supplied for dam level monitoring. Electromagnetic and paddle-wheel flow meters were evaluated for flow measurement and totalization, with the client selecting a paddle-wheel style to minimize costs.

Sensoterra supplied multi-depth, hammerable soil moisture probes, with a LoRaWAN communications



Concept Design

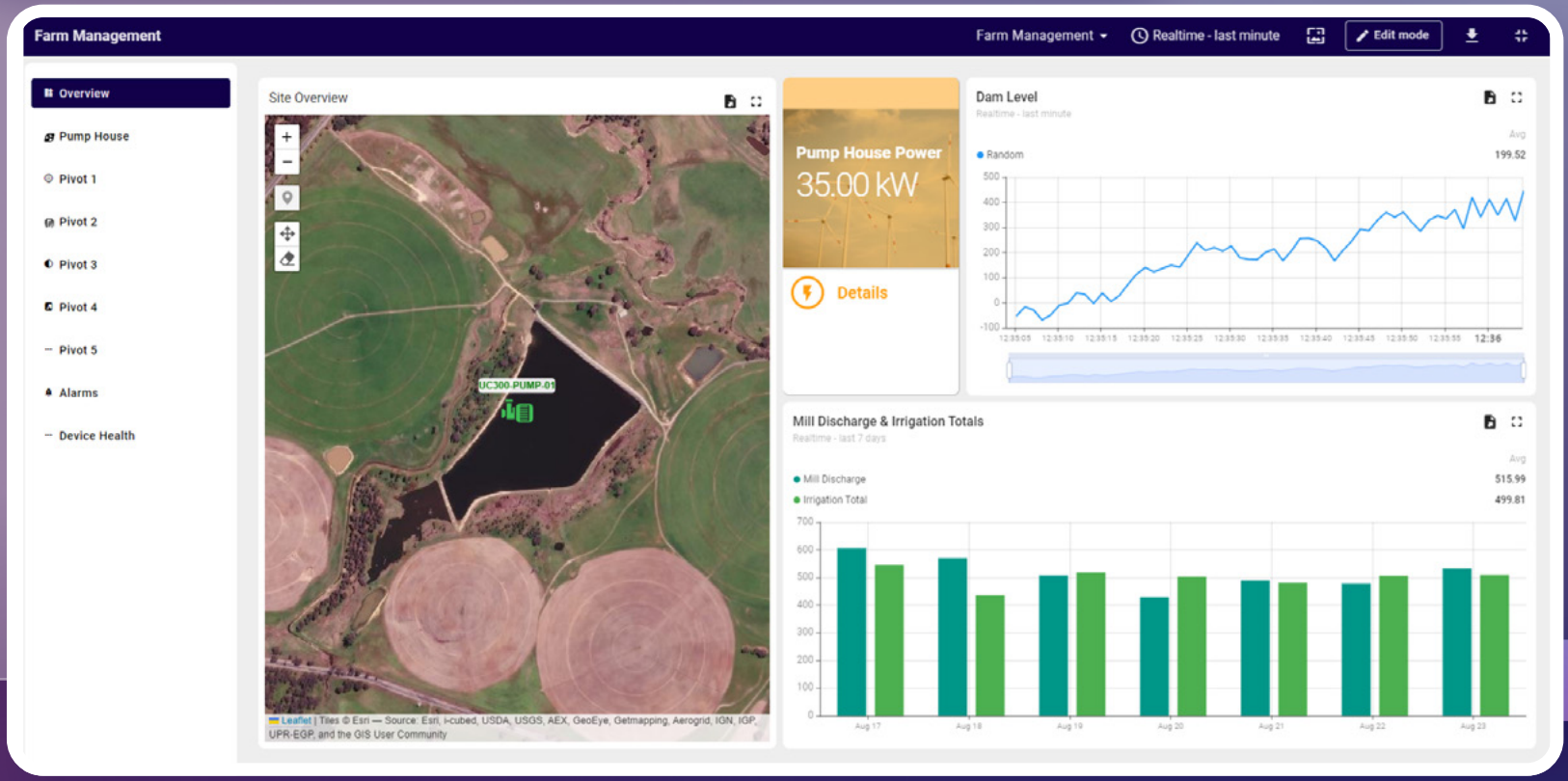
Legend	
	LoraWAN + 4G Gateway
FIT	Flow Transmitter
PIT	Pressure Transmitter
	Digital Input Sensor
	Multi-Level Soil Moisture



LoRaWAN coverage modelling

System Integration

Site telemetry was securely aggregated to the cloud, using CapitalAI's NexAI platform, which allows dashboarding, analytics, reporting, and real-time control and alarming. As an existing NexAI customer, this solution could be deployed to the customers tenancy without incurring any additional license or platform costs.



Outcome

By adding additional solutions to NexAI, the customer brought their farm management practices into the 21st century, and ensured effortless compliance with reporting obligations. Farm staff have the ability to control equipment remotely from a mobile device, and can precisely monitor irrigation and moisture profiles

NexAIs flexibility, vendor and protocol agnostic integration capabilities, and advanced analytics allowed for a rapid, cost-effective solution deployment.

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