

*Turning a*  
**Pig's Ear into**  
**a Silk Purse**

**Reviving a wastewater  
to land irrigation system**

Nick Adams

# Introduction

- Real project 2 years ago
- Food-processing plant, land-based wastewater disposal
- Risk of operational and compliance failure
- Goal: Restore reliability fast while planning long-term fix



# The Key Ingredients

**Collaborative operations staff + local supplier**

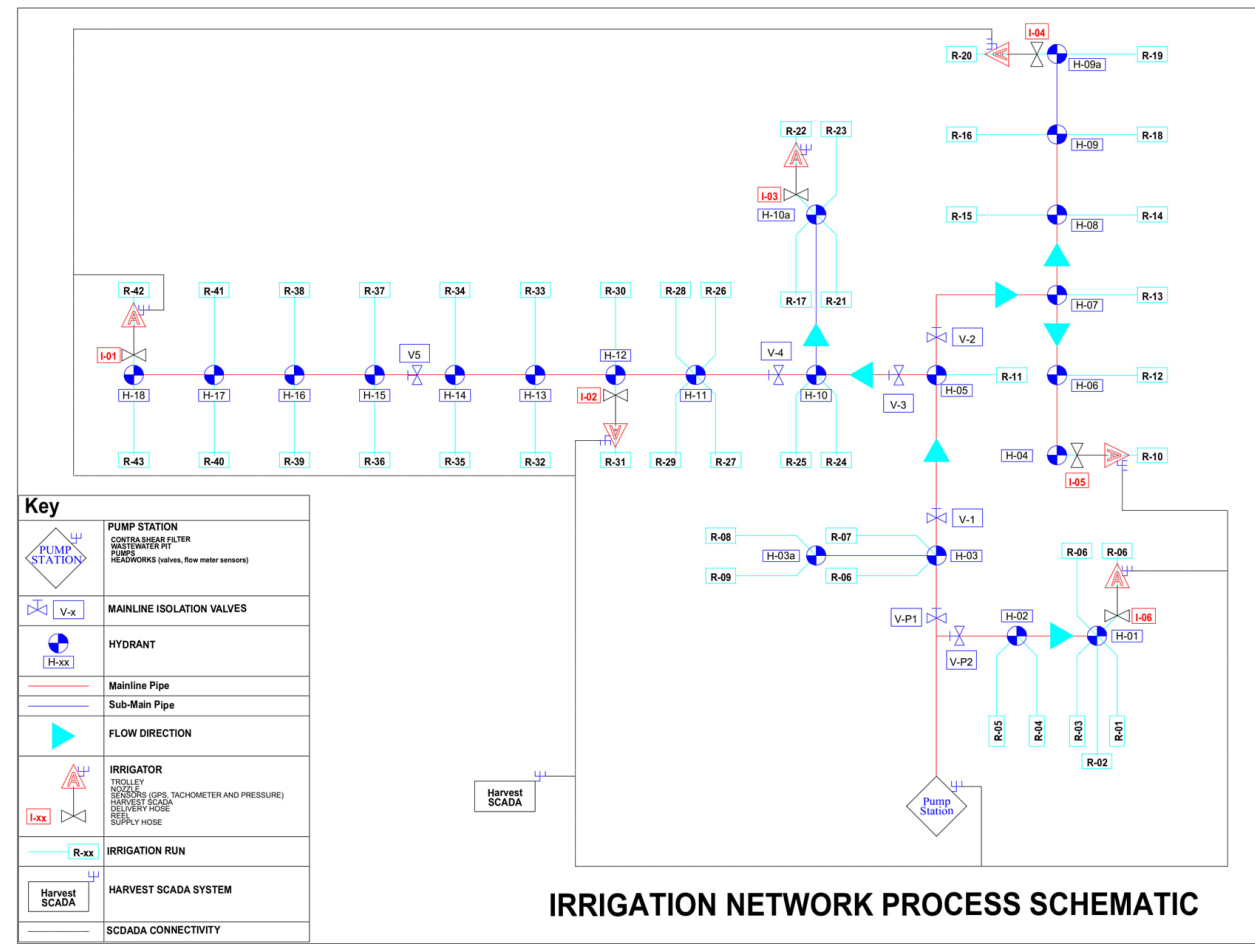
**Supportive management**

**Clear understanding of problem + consequences**

**Understanding existing assets and performance**

**Smart, targeted technology**

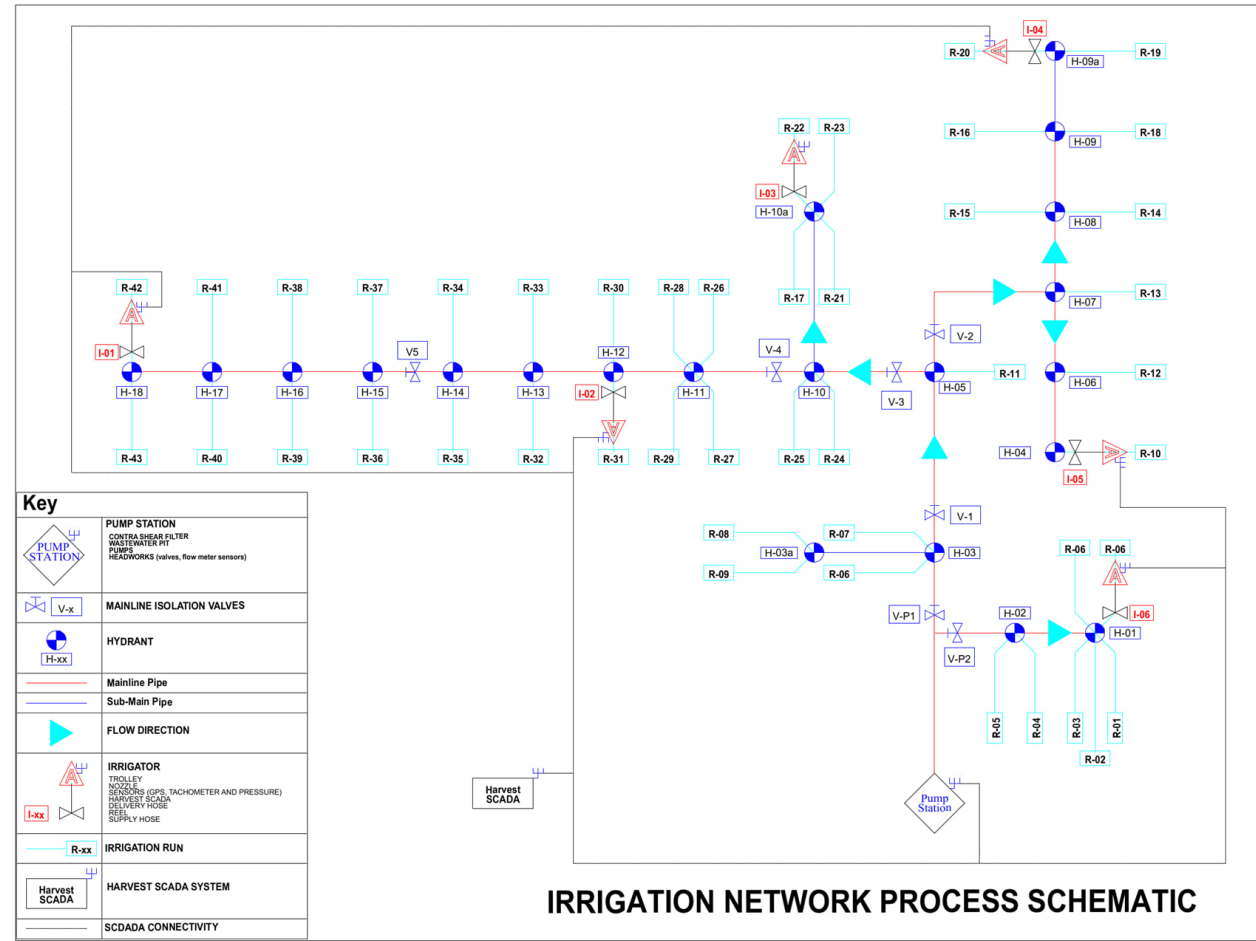
# Understand it Before You Fix It



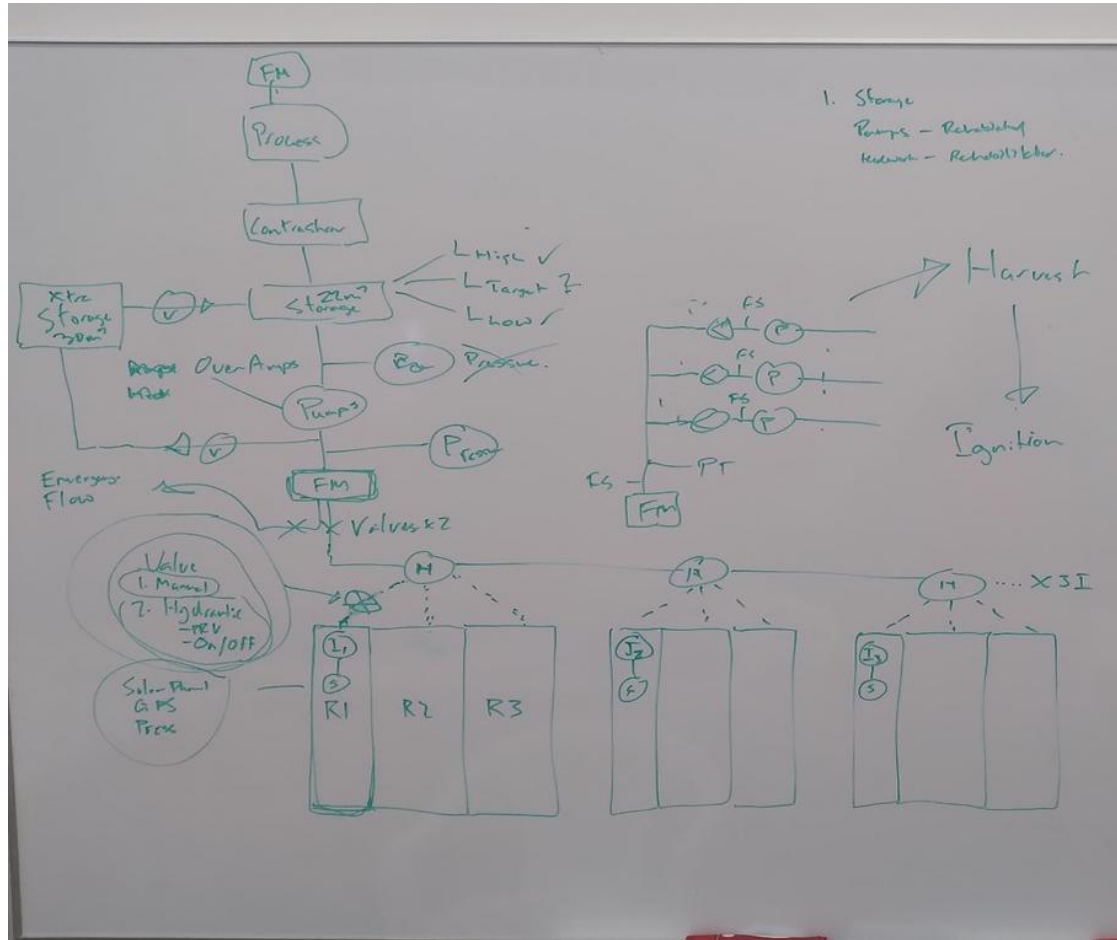
# Understand it Before You Fix It

## A Structured Diagnostic Approach

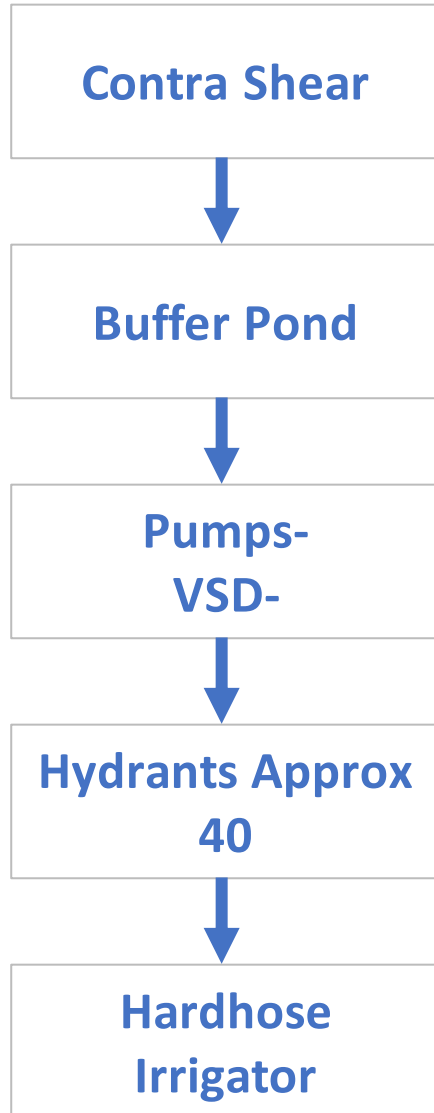
- Gathered drawings, historic data, and system notes
- Walked the system with farm manager + plant engineer
- Measured actual performance: flow, pressure, speed
- Identified root causes, not symptoms
- Workshopped with farm manager and plant engineer
- Built staged plan: immediate → short → medium → long term



# Brain Storming



# Existing System:



# The Problem: Irrigation System on the Brink of Failure.

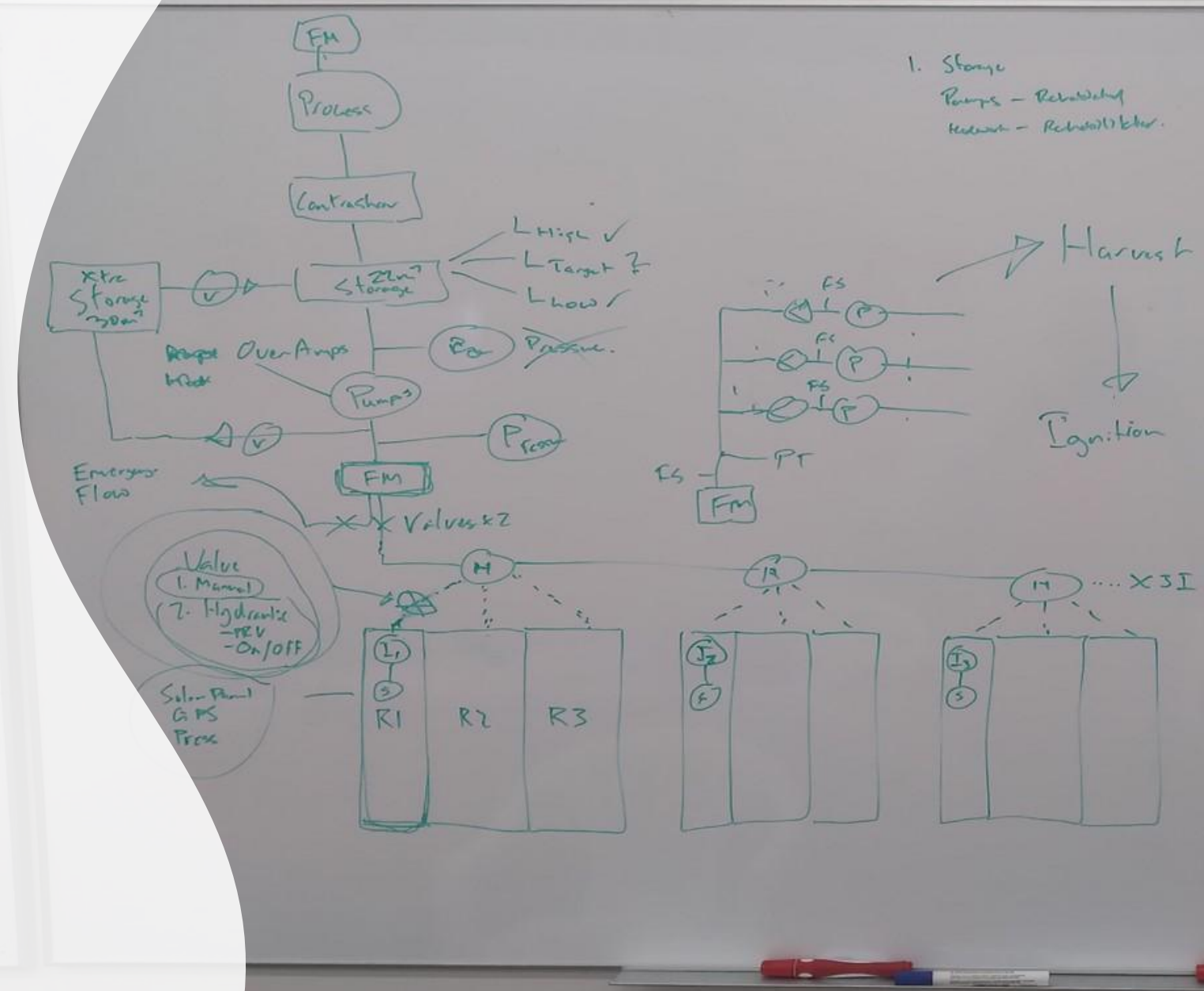
## High Risk, Low Resilience

- Travelling irrigators with **inconsistent performance**
- No pressure, speed, or GPS feedback
- **Manual operation** → high risk of:
  - Over application
  - Ponding/runoff
  - Stopped irrigators still applying
  - Undetected pipe failures
- **Consent conditions** strict and unforgiving



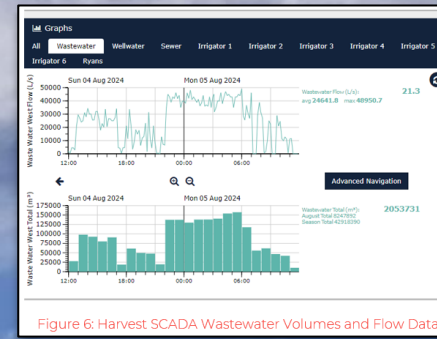
# Replace or Resurrect Engineering Under Time Pressure

- **New fixed sprinkler system = best long term solution**
- **But design-procure-build timeline too slow**
- **Resurrecting existing system = immediate improvement**
- **Low capital, fast results**
- **Decision: run both tracks in parallel**

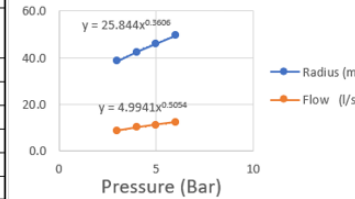


# Immediate Fix Stabilising the Highest-Risk Issues

- Smaller Nozzles  
25mm/run  
50mm/run allowed
- Monitored with Harvest
- Repaired irrigators (e.g., shut off valves)
- Tightened Procedures

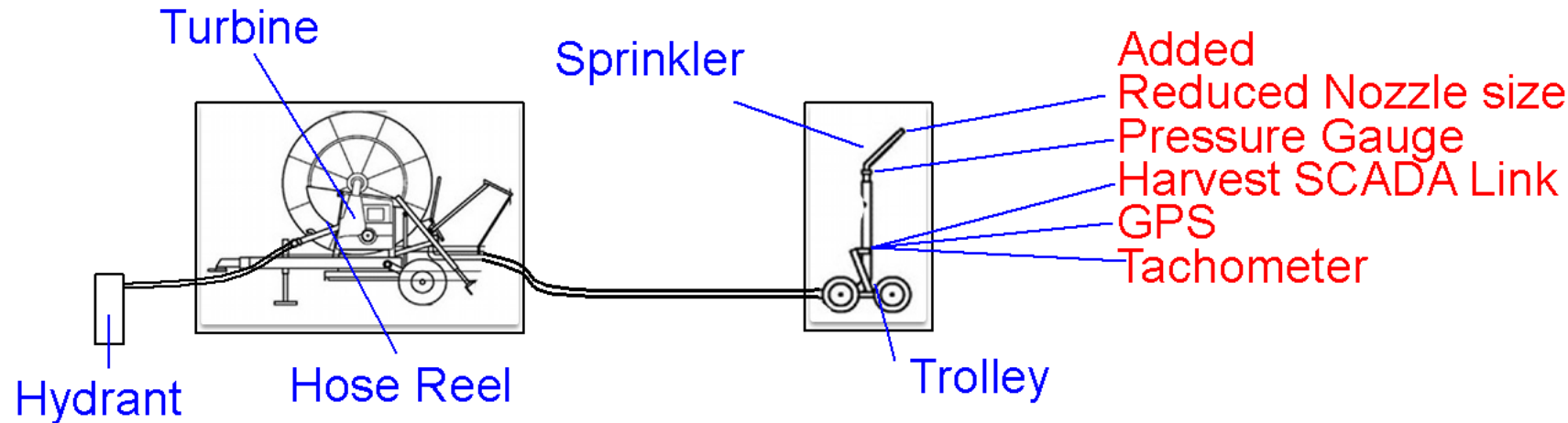


Irrigator Performance Data.	Expected	Upper	Lower	
Application rate/ Irrigation Run	mm	20.4	29.3	17.0
Nozzle Diameter	mm	22	22	22
Speed	m/hr	20	15	25
Nozzle flow	l/s	8.7	11.3	10.1
	m <sup>3</sup> /hr	31.3	40.6	36.2
Nozzle Pressure	Bar	3	5	4
Radius	m	38.4	46.2	42.6



Based on Manufacturer Data			
Nozzle Diameter	22	mm	
Pressure (Bar)	Flow (l/min)	Radius (m)	Flow (l/s)
3	522	38.5	8.7
4	604	42.5	10.1
5	676	46.0	11.3
6	741	49.5	12.4
K		25.84	4.9941
n		0.36	0.51

Nozzle Diameter	3 bar		4 bar		5 bar		6 bar		7 bar	
	Flow Couplant (l/min)	Radius Allowance (m)	Flow Couplant (l/min)	Radius Allowance (m)	Flow Couplant (l/min)	Radius Allowance (m)	Flow Couplant (l/min)	Radius Allowance (m)	Flow Couplant (l/min)	Radius Allowance (m)
16 mm	276	32.5	320	38.5	356	39.5	391	42.5	-	-
18 mm	350	34.0	404	39.0	452	42.0	496	44.5	-	-
20 mm	432	36.0	501	40.0	560	44.0	613	47.0	-	-
22 mm	522	38.5	604	42.5	676	46.0	741	49.5	-	-
24 mm	623	40.0	720	44.5	806	49.0	882	52.5	-	-
26 mm	732	41.0	848	46.0	946	50.0	1037	54.0	-	-
28 mm	848	43.0	981	48.0	1096	52.0	1202	56.0	-	-
30 mm	974	44.5	1127	50.0	1260	54.0	1381	58.0	-	-
32 mm	-	-	1282	52.0	1433	56.0	1570	59.5	1694	63.0
34 mm	-	-	1448	54.0	1619	57.5	1774	61.0	1913	65.0



# Medium Term Fix

- Added Automatic shut-off Valves
- Added app to control Irrigators remotely
- Staff training
- Developed Living Irrigation Management Plan

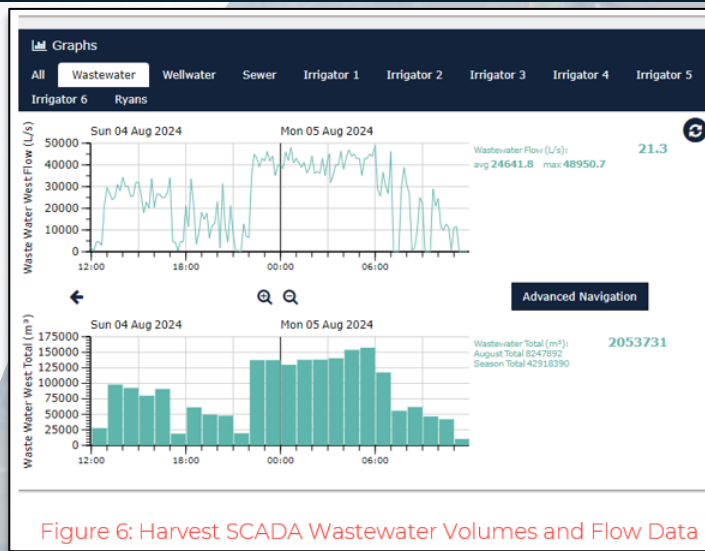
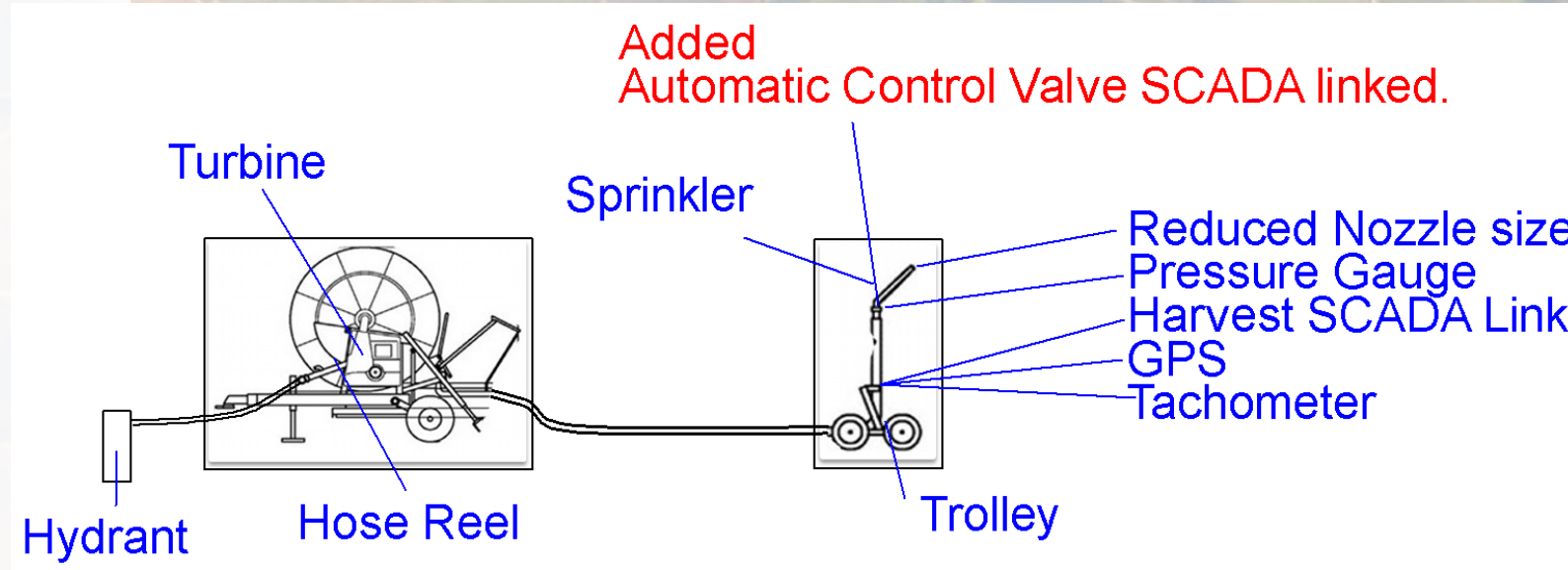


Figure 6: Harvest SCADA Wastewater Volumes and Flow Data



# Long Term Fixes



## Long Term Fix

### Future Proofing the System

- Integrate with Factory SCADA
- Prepare for long term upgrades
  - New irrigation system
  - Deficit irrigation
  - Soil moisture sensors
  - Enlarged Buffer storage

# Smart Tech + People = Turnaround Targeted Upgrades, Not a Tech Dump

- **People** → operators, supplier, management
- **Pressure sensors** → detect over application + failures
- **Tachometers** → confirm irrigator speed
- **GPS** → verify run locations + setbacks
- **SCADA** → monitoring, alarms, reporting
- **Documentation** → Irrigation Management Plan





L E W E  
Environmental  
I m p a c t

