VICTORIA State Government Jobs, Precincts and Regions

Optimising spray irrigation systems

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VICTORIA State Government | Environment, Land, Water and Planning

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

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Agriculture Victoria irrigation system assessments

- Application depth
- Application rate
- Application uniformity
- Pressure testing
- Energy use assessment
- Design assessment

Low application depth

System age (years)	% of target app depth
2	95%
2	67% D
3	95%
3	74% D
3	68%
4	97%
4	88%
4	85%
5	87%
5	67% D
12	91%
14	120%
15	45% D
19	83%

Systems are applying an average of

20% less

than the farmers thought!!

- Measure how much water your system is actually applying.
- Use soil moisture monitoring and field inspection to ensure that irrigation events are effective.

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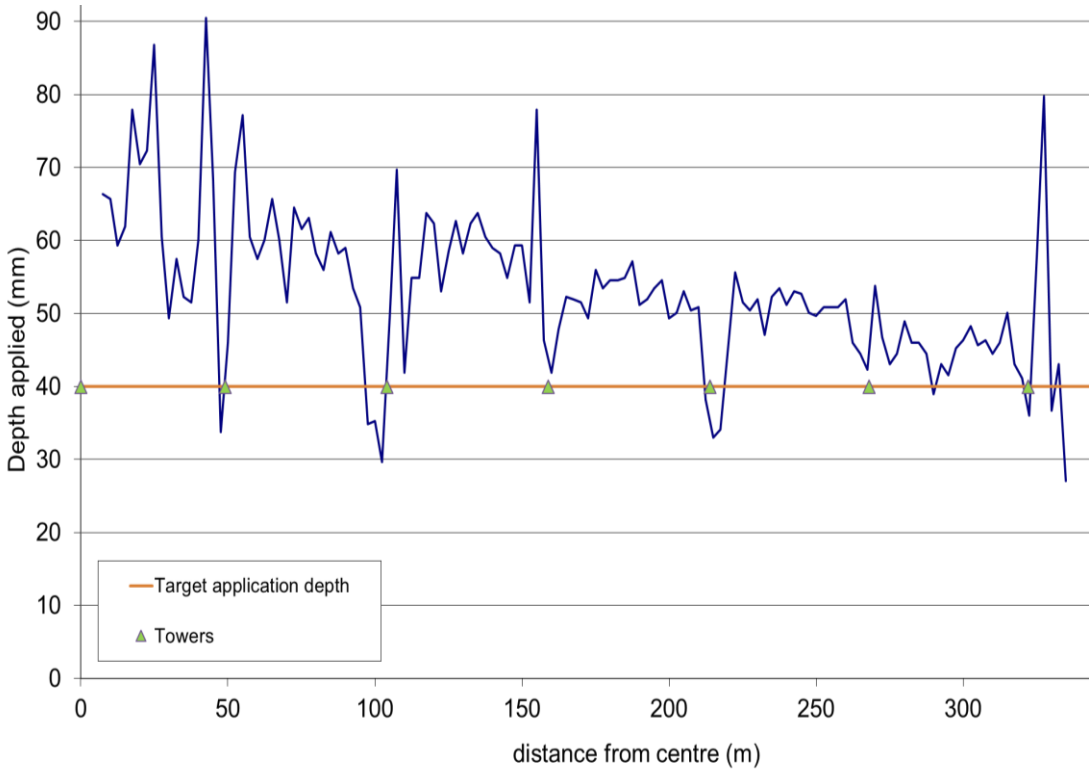
Application variability

2 causes – poor application uniformity (design, maintenance)
– poor infiltration (soil, design, scheduling)

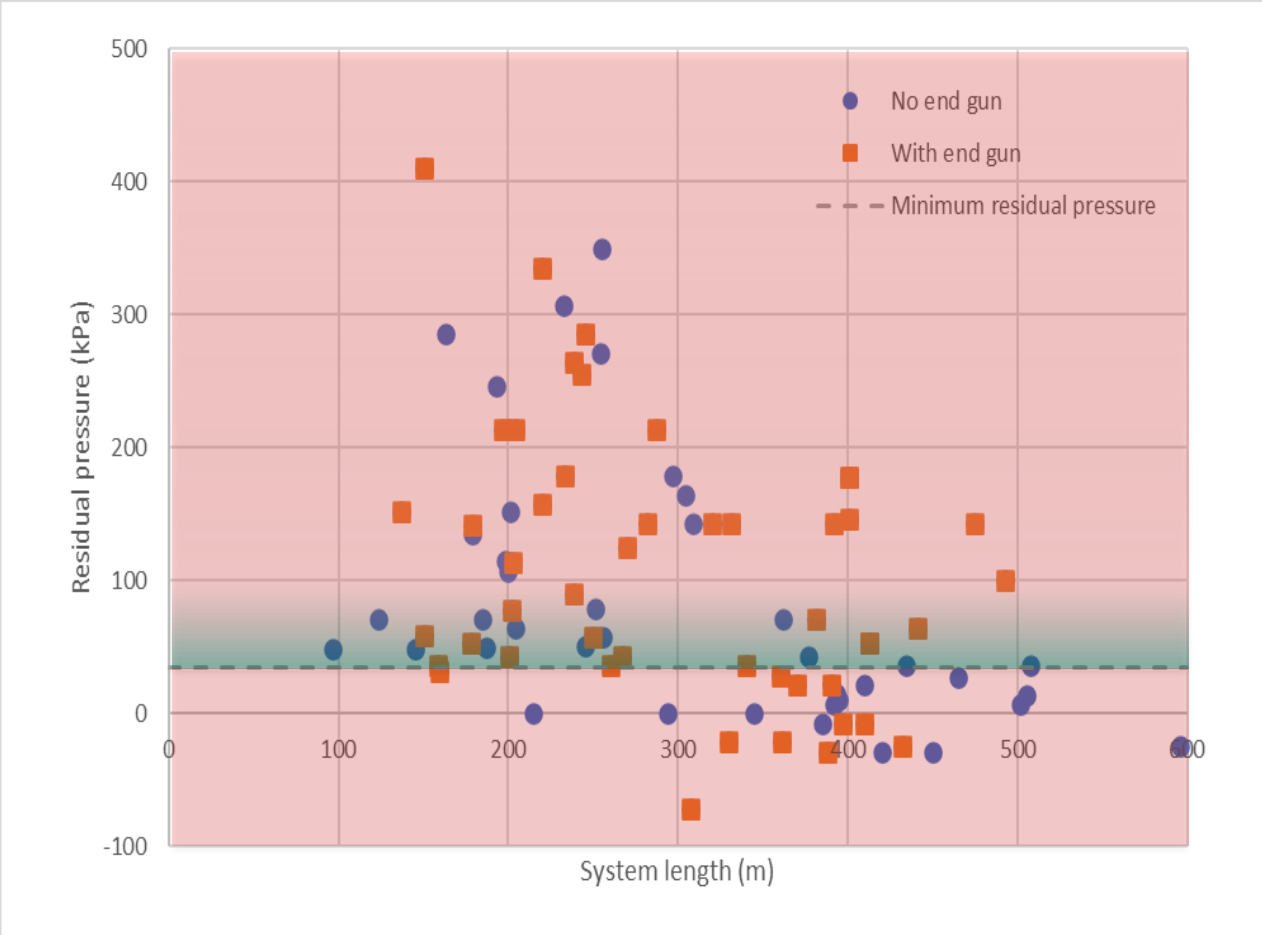
Some areas over irrigated, other areas under irrigated.

- Difficult to schedule irrigations
- Investment in drainage and soils solutions
- Variability in production



Low residual pressure is a common cause of low application depth and poor application uniformity.

- **Residual pressure** should be >35 kPa
- Systems over 300 m – 55% had **low** residual pressure
- End guns did not consistently influence residual pressure



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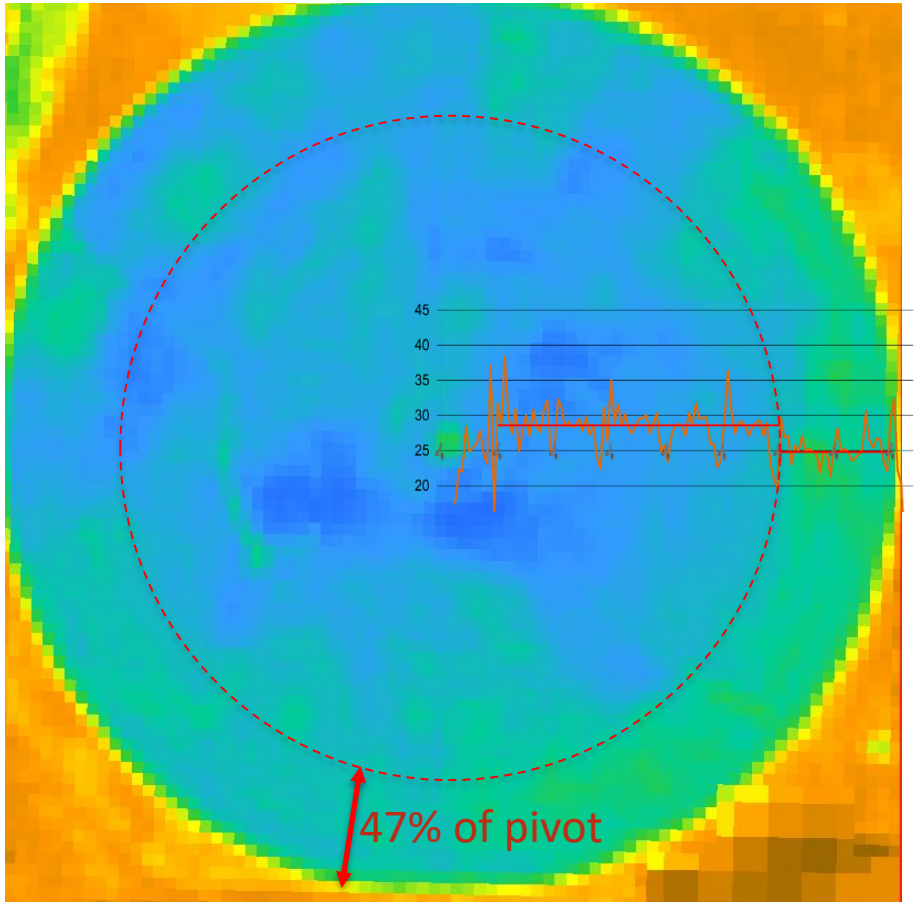
Low residual pressure = low application depth and lower productivity

- End pressure = 6 psi, should be 15 psi
- 47% of the area is getting 12% less water
- 7 ML/ha instead of 8 ML/ha



Irrisat

irrisat-cloud.appspot.com

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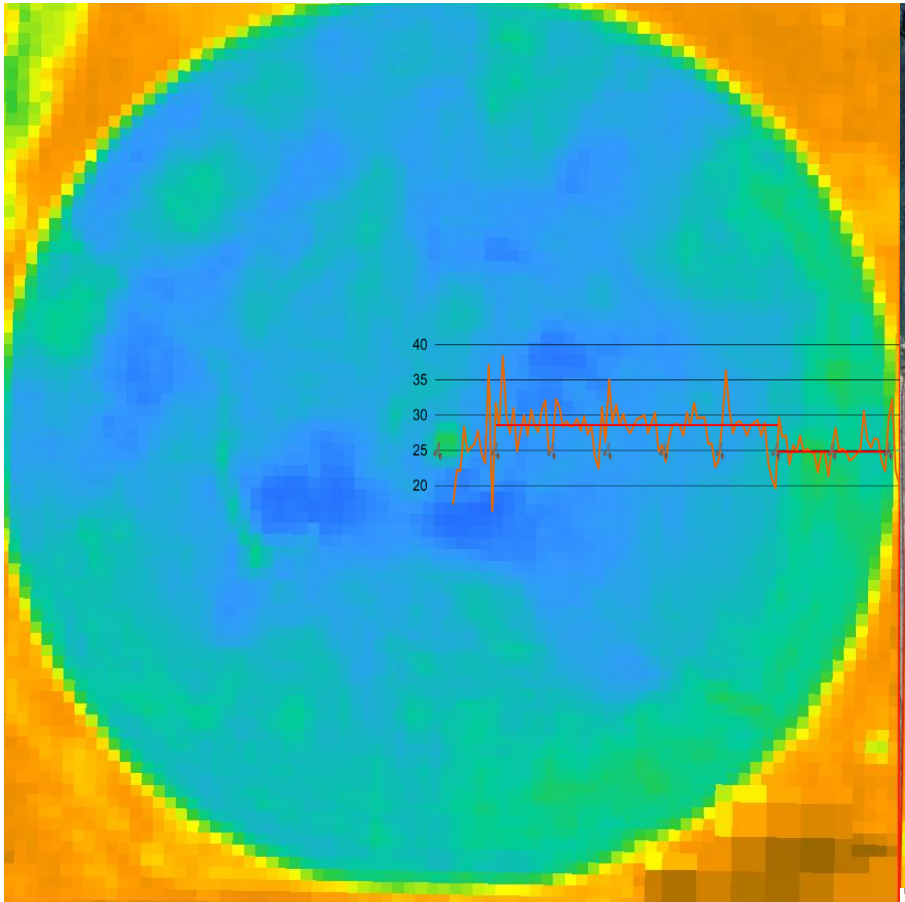
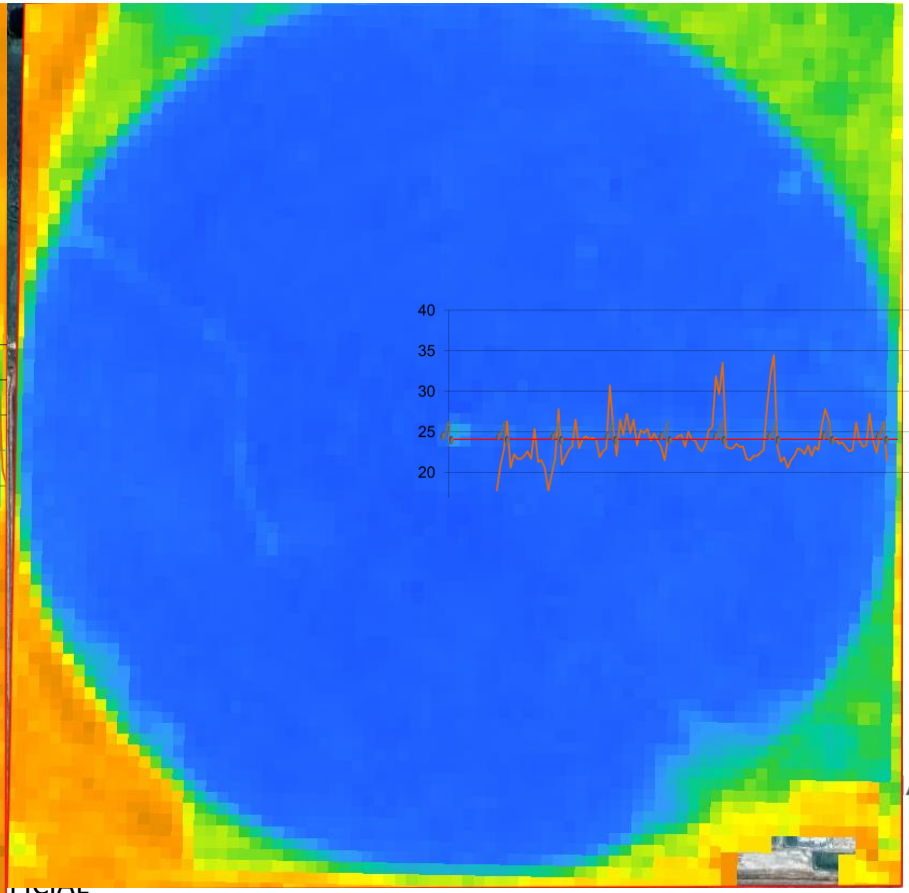
Changing system capacity to improve uniformity and productivity

- 17.2 mm/day or 8.2 ML/day
- Achieving 7.72 ML/day
- End pressure = 6 psi

- 14.4 mm/day or 7.1 ML/day
- End pressure = 15 psi



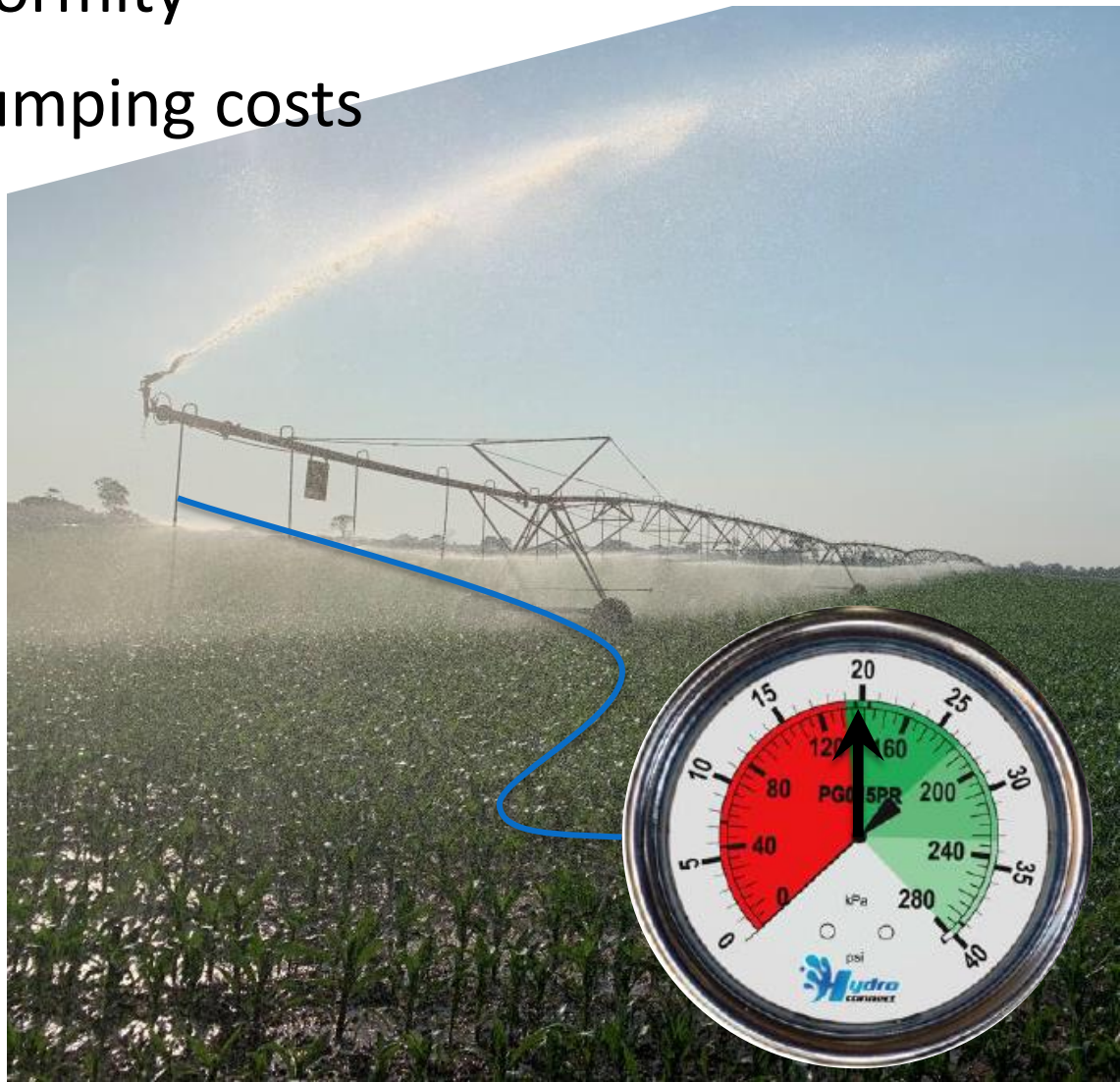


Checking system performance and uniformity

Measure pressure at the end of the system

Low pressure = poor uniformity

Excess pressure = high pumping costs



Optimum design of centre pivots

- Have a pressure gauge at the end of the system
  - Check system end pressure (35 kPa > regulator rating)
- Appropriate system capacity (14 mm/day for maize in the GV)
- Appropriate system length (< 400 m)
- Appropriate pipe size (pivot, delivery and suction)
- Maximise sprinkler footprint (spreader bars, sprinkler selection)
- Remove end guns (or at least do not use for summer irrigating)
- VFDs for multiple duty points, otherwise correct pump and impeller selection

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Further information

Irrigating Agriculture - https://extensionaus.com.au/irrigatingag/home

Irrigation System Selection & Design Guidelines

Acknowledgments

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DEECA - Sustainable Irrigation Program

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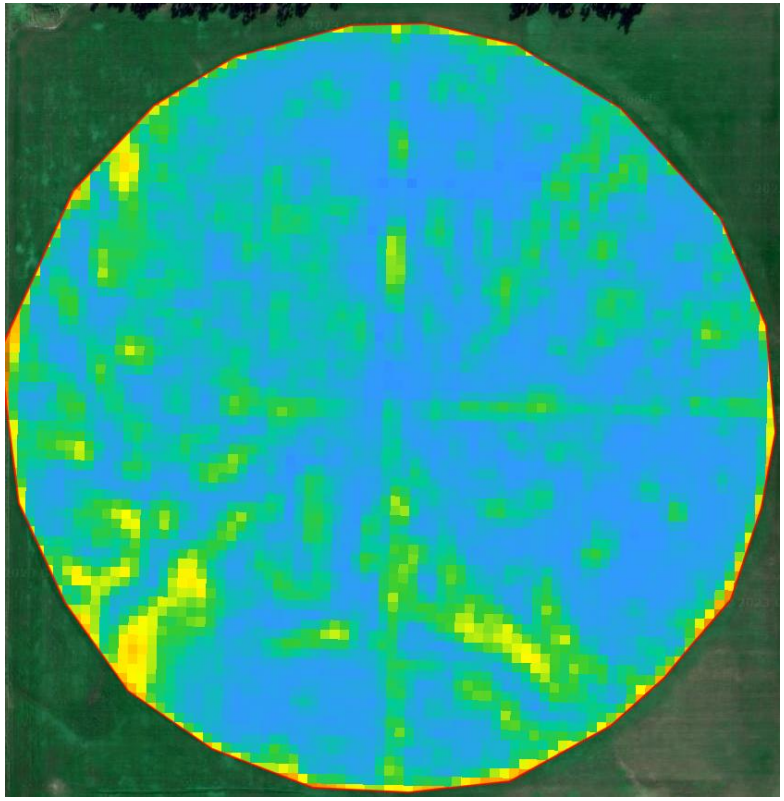
Non-wetting soils

Caused by waxy organic compounds derived from the breakdown of organic matter material

Feb 2022



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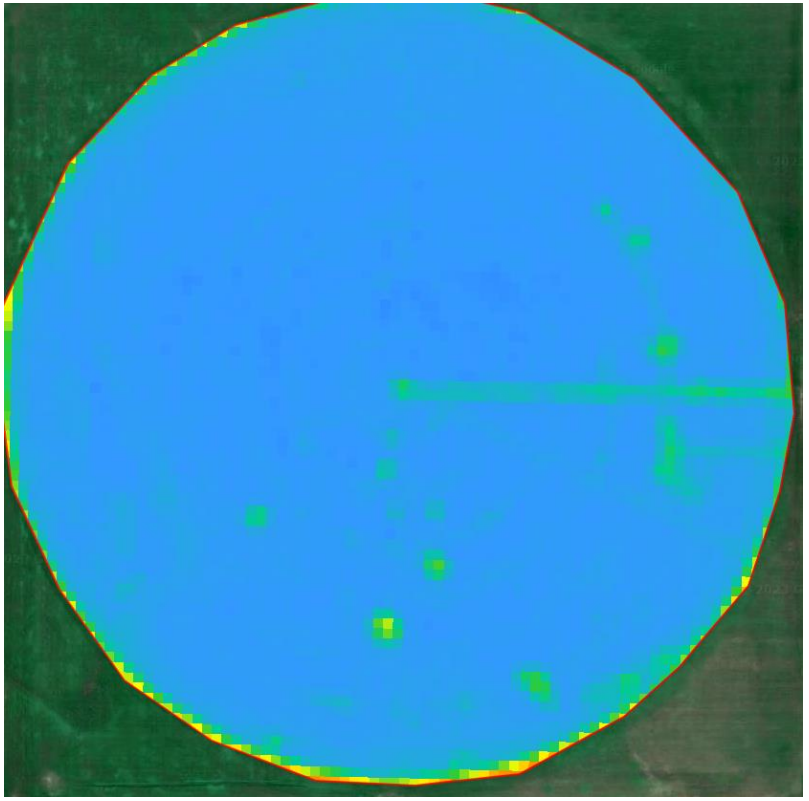

Avoid runoff

Regular small application depths (8-9 mm every 1 to 2 days)

Developing issues with wheel tracks

Subsoiling implement

Treatments

- 3 runs of each treatment

Heywood	Myer
Control	
Surface applied	
Compost ripped at 10 cm	
Compost ripped at 15 cm	
Compost ripped at 30 cm	
Rip only at 10 cm	Compost ripped at 5 cm
Rip only at 30 cm	Rip only at 5 cm

Compost at 10 cm

Compost at 15 cm

Compost at 30 cm