Waste Water Reuse

From Woodlot to Vineyard

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JJC Operations

Presentation to the
Winery Engineers Association
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Everyone’s talking about Water

Why recycle water?

Minimise environmental risk

Preservation of resources

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Preservation of resources

Outline

- Principles and guidelines for a reuse system
  - Sustainability
  - Hierarchy of waste
  - Water balancing – matching quality and needs
  - Regulatory issues – Health & Environment
  - Water and nutrient balance
  - Environmental safeguards
- Case studies
  - Wirra Wirra
  - Casella
  - Penfolds/Tarac (NPEC)

Are my Operations *Sustainable*?

Can I keep doing this forever and not have a detrimental effect on the Environment?

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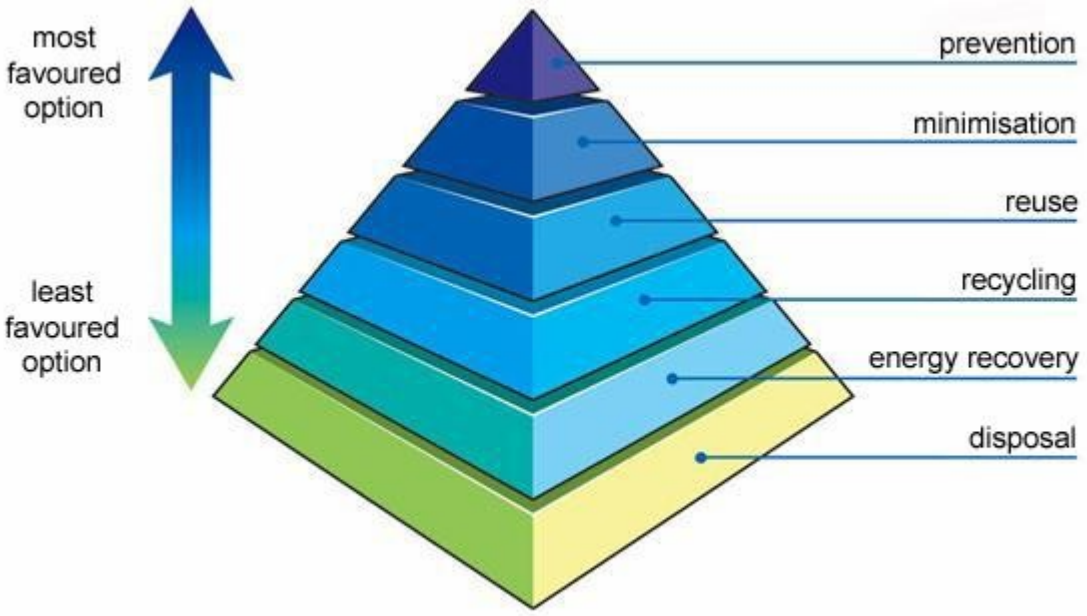
How do you know??

– Predict based on best information available

– Monitor to ensure, reduce risk

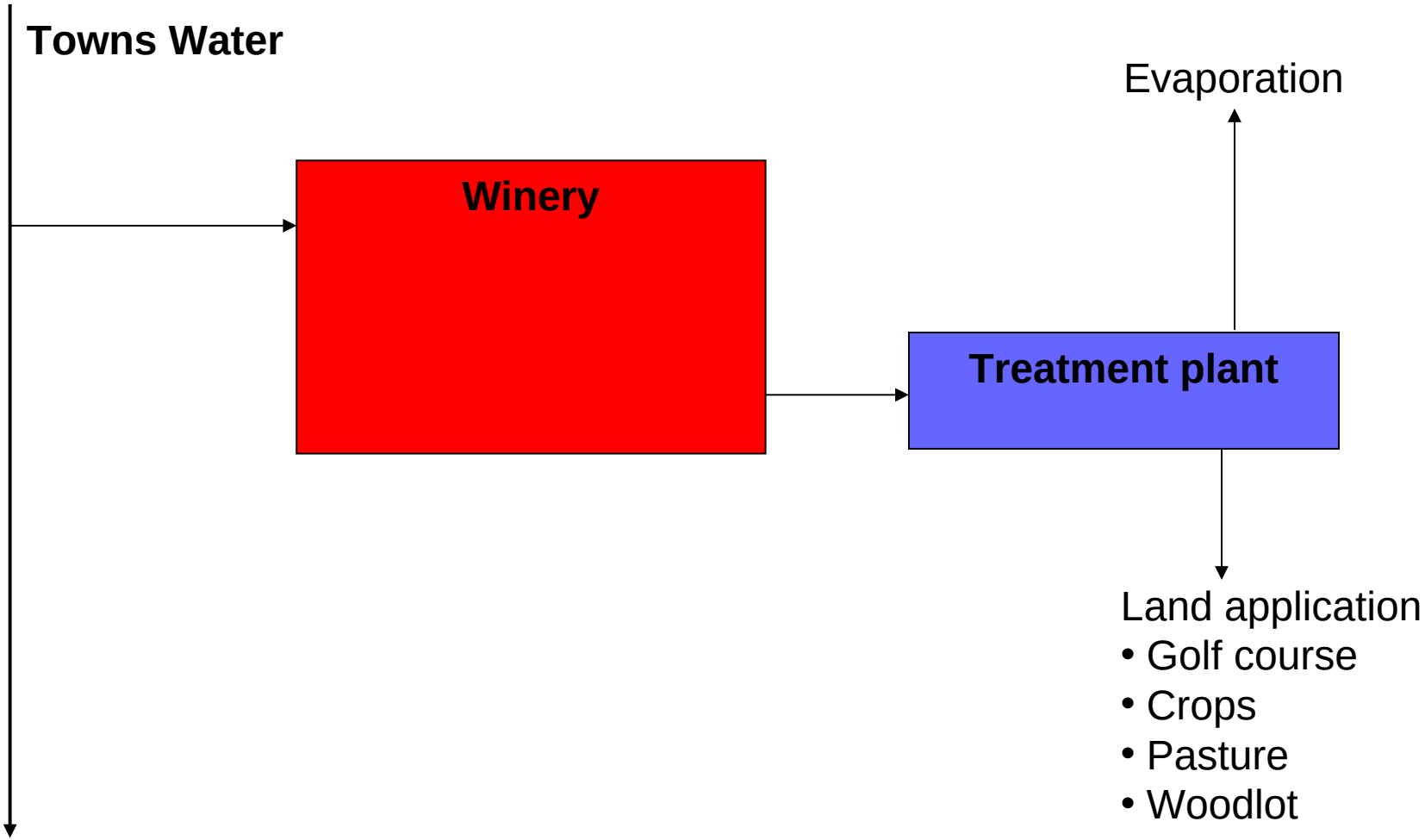
Underlying principle used by Regulators

The *Waste Hierarchy* helps guide decision making on approaches to waste management



Before looking at moving from “Disposal” to “Recycling”, we should consider options for ***Prevention and Minimisation***

Water balancing



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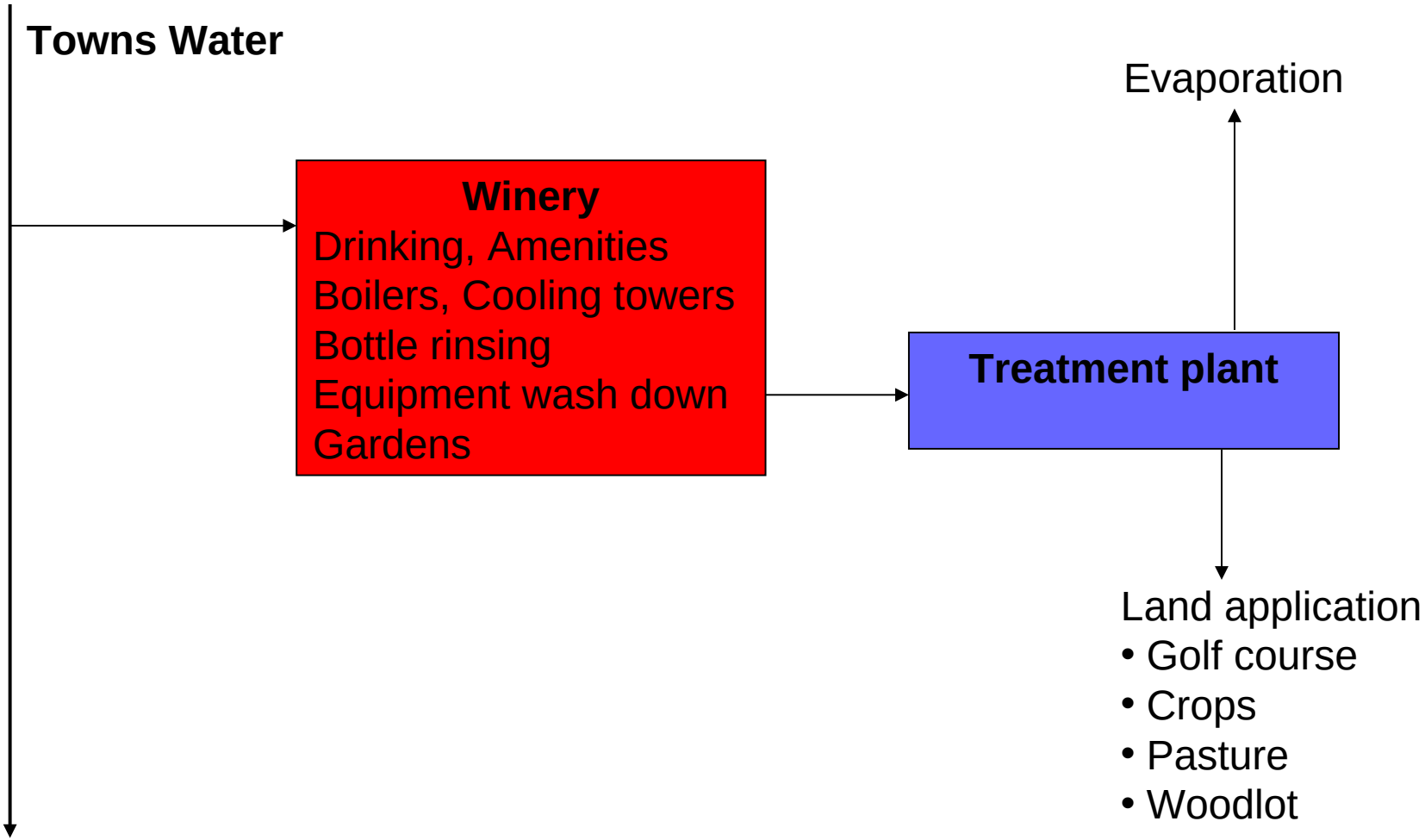

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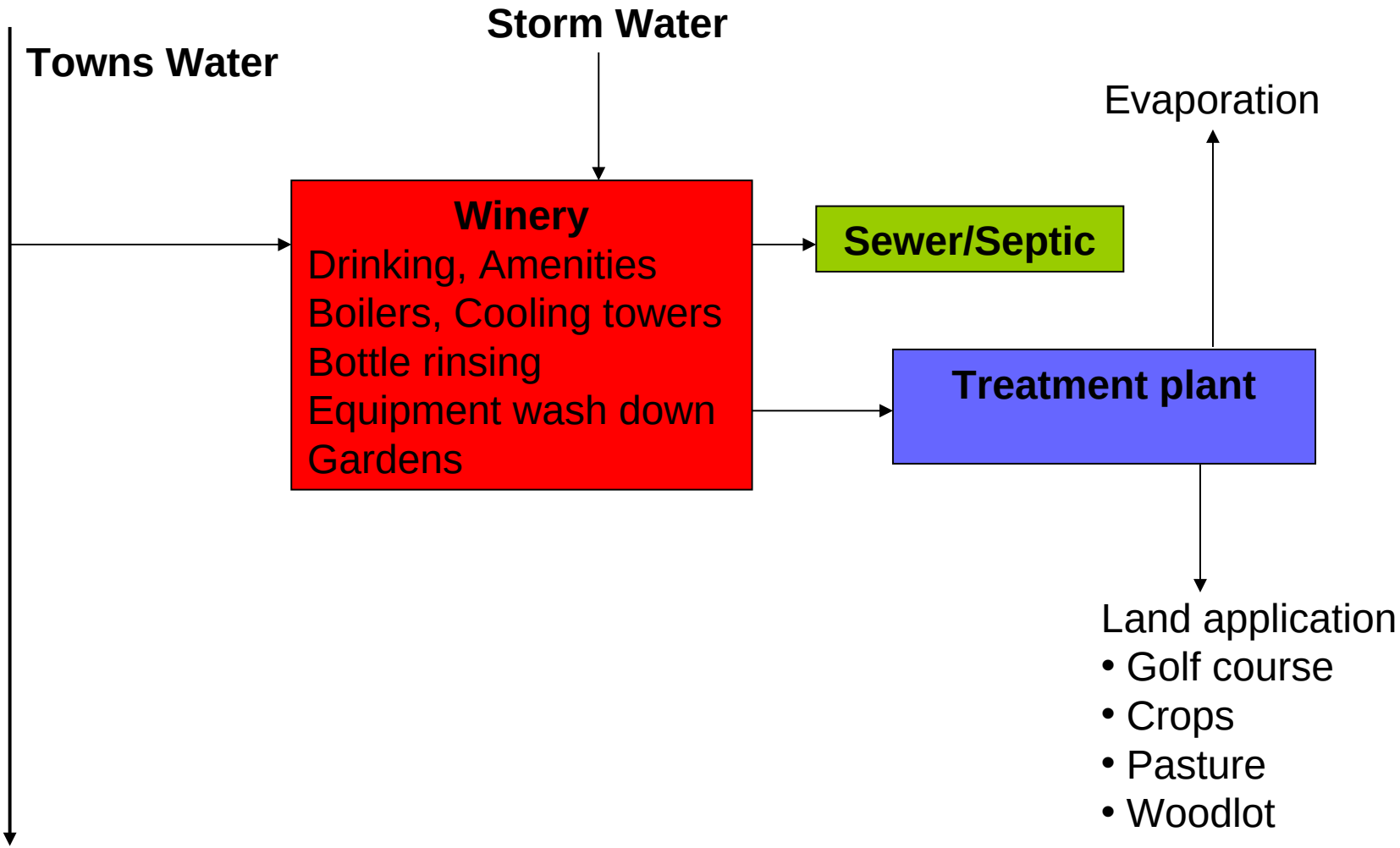

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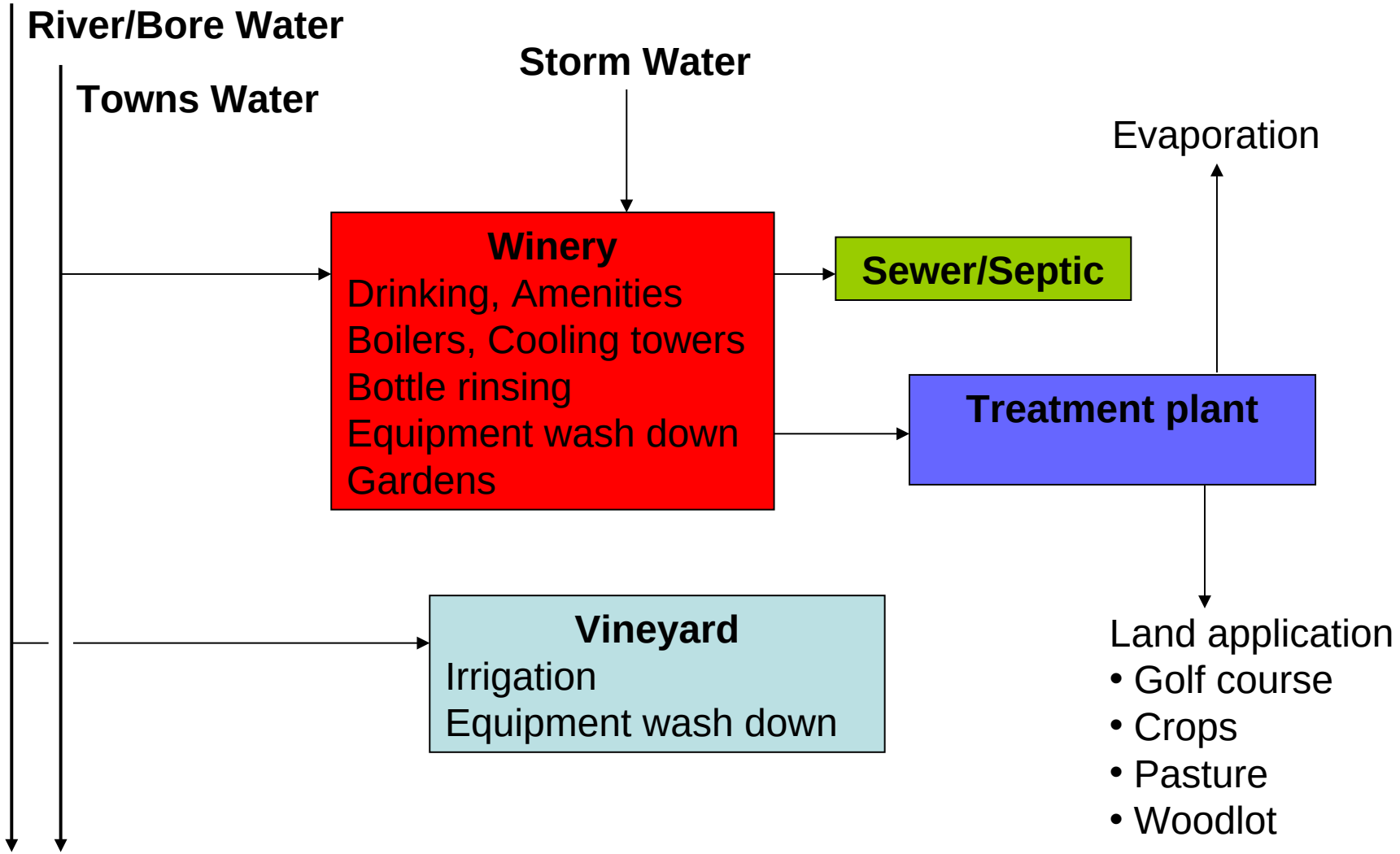

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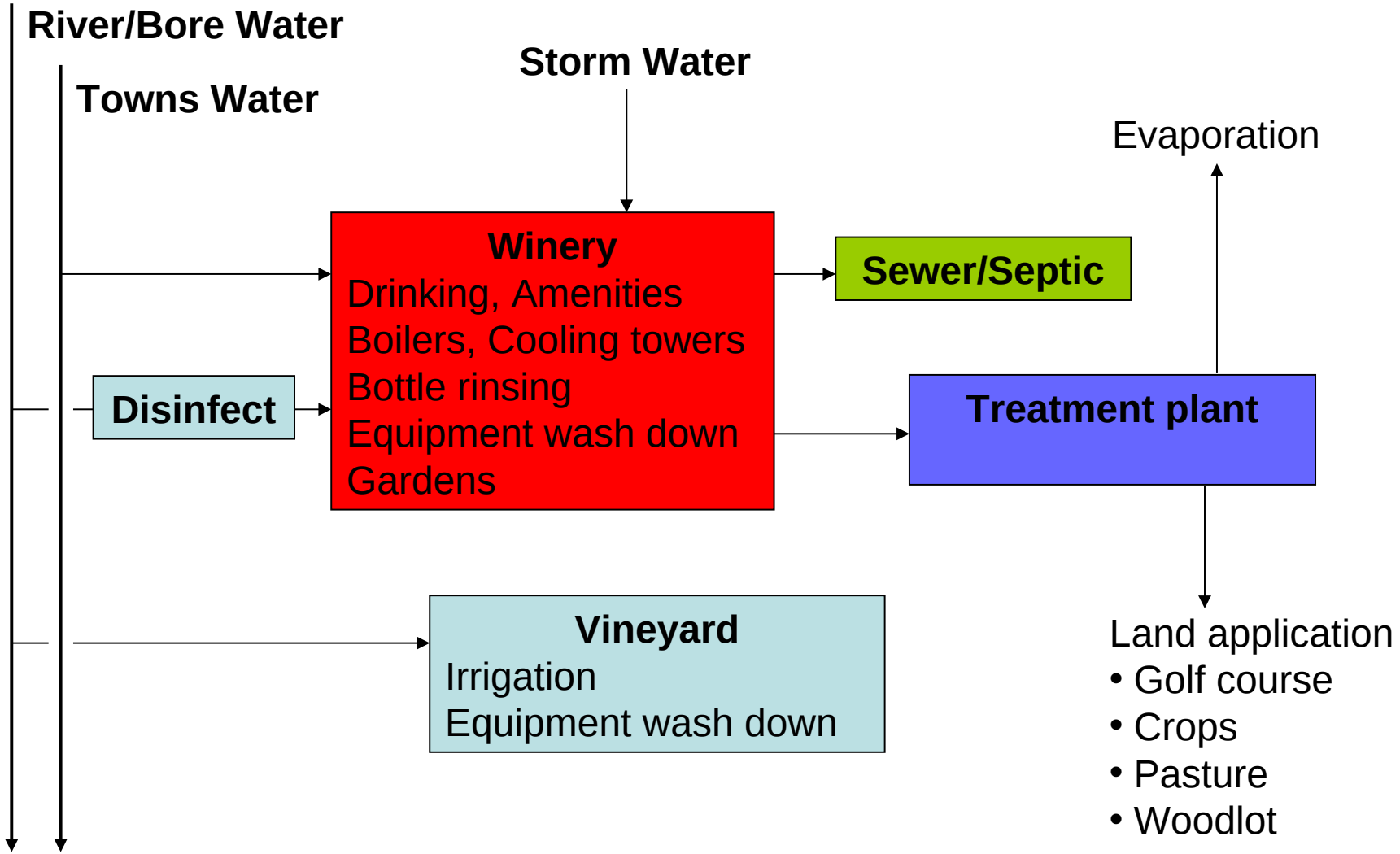

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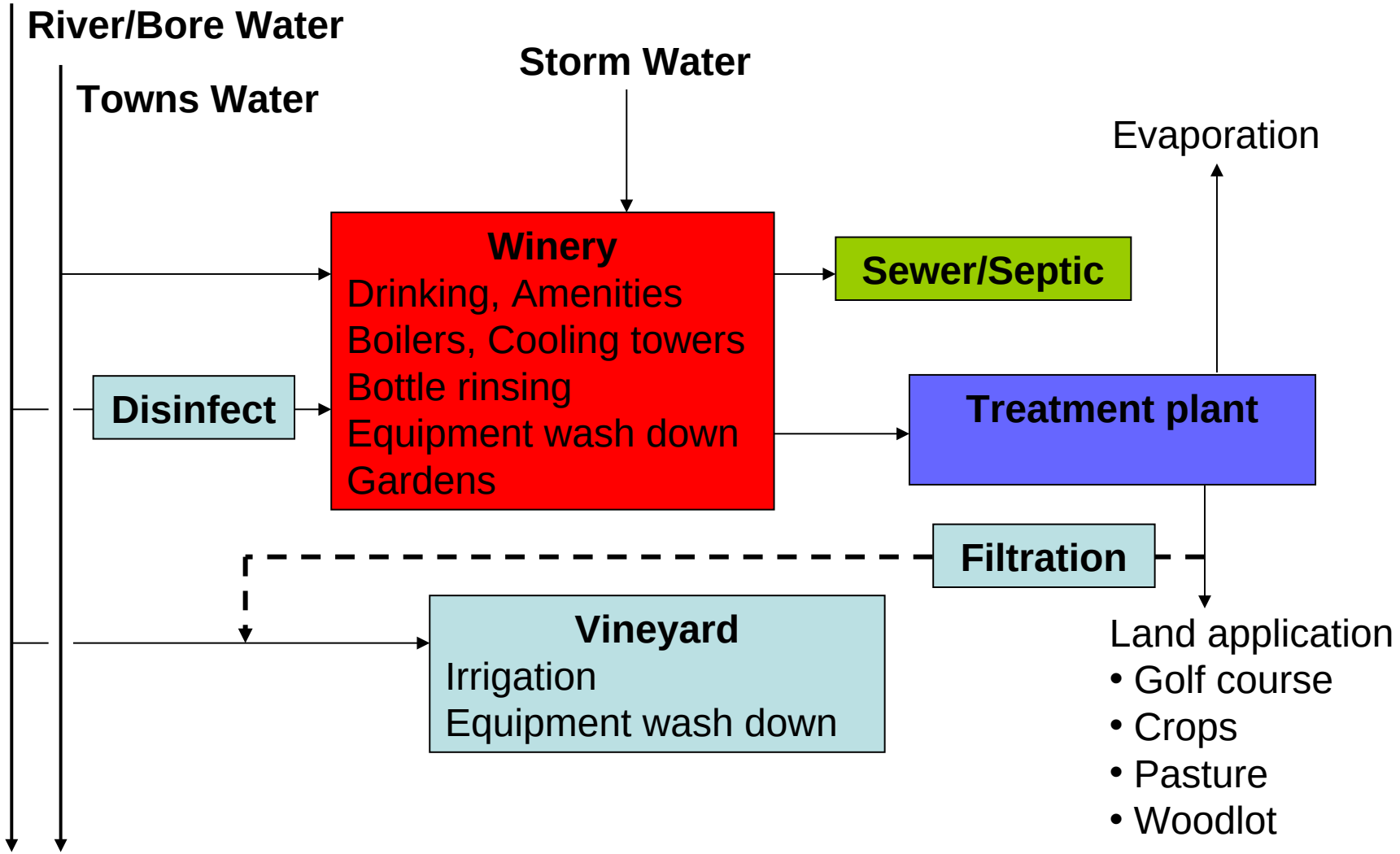

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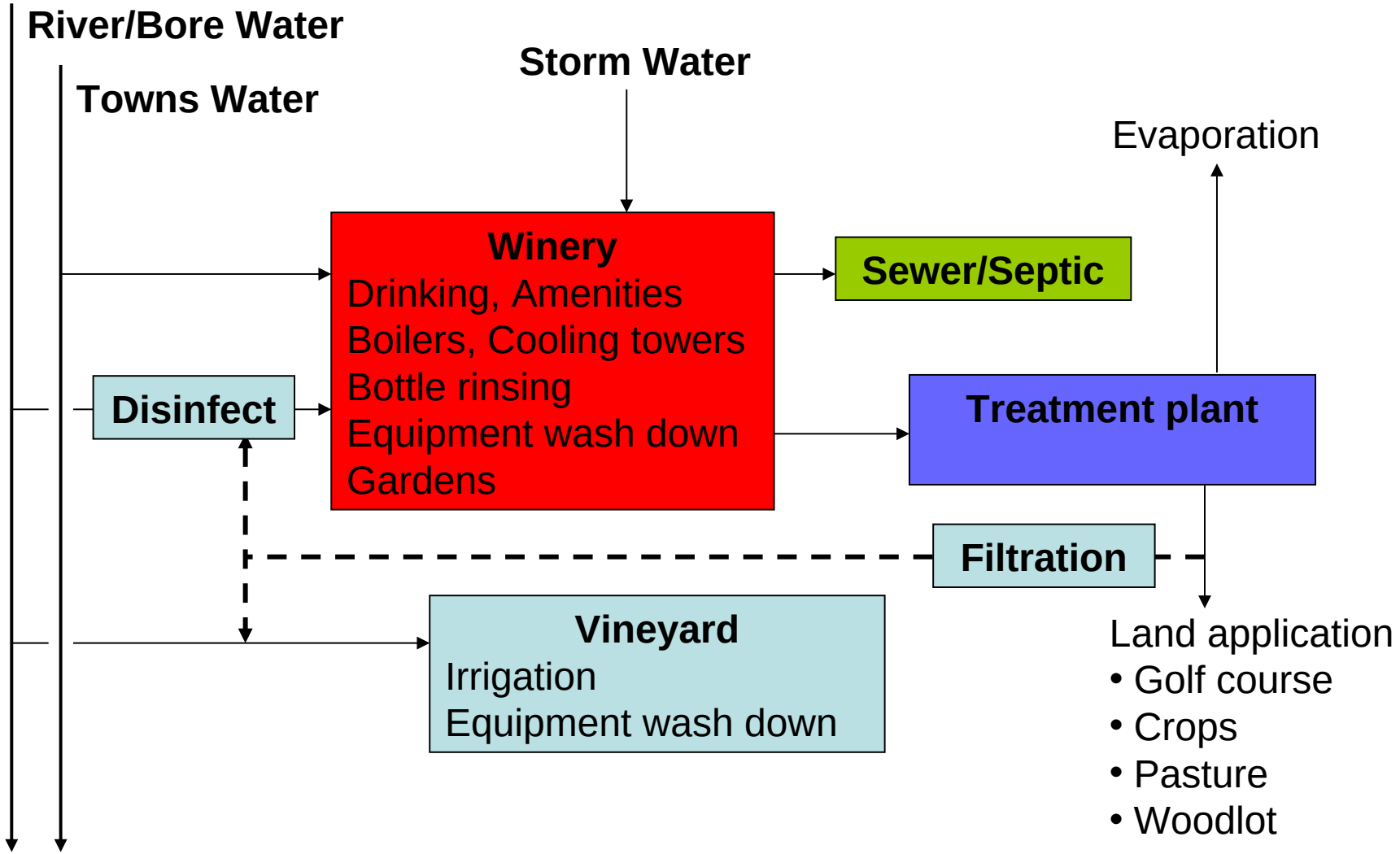

Matching Water Quality and Use

Water Source	Treatment Level	Water uses
Towns water (Potable)	Filtration, disinfection, monitoring (ADWG) • ***E.coli, heavy metals*** • ***Residual disinfectants*** • ***pH, Salt (TDS,EC)*** • ***Turbidity***	Drinking Product contact Boilers, Cooling towers Equipment wash down
River/Bore water	Filtration	Irrigation
Waste water	Screen	Disposal

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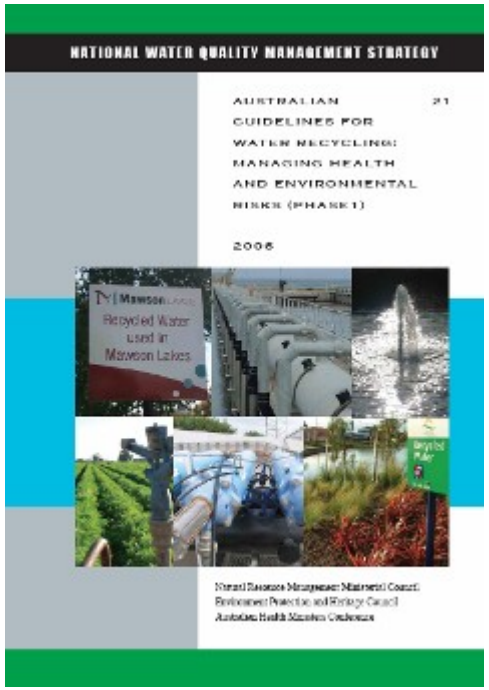
Regulatory framework

- "Guidelines" at a National and State level
  - Becoming less prescriptive, based on HACCP
  - Need to interpret for "Industrial Waste"
  - Focus is on Risk Management
    - Health (generally not an issue)
    - Environment (an issue)
  - Governed by the EPA, DHS
  - Deal with risks by
    - Increasing treatment level
    - Limiting extent of reuse
  - ADWG provides quality benchmarks



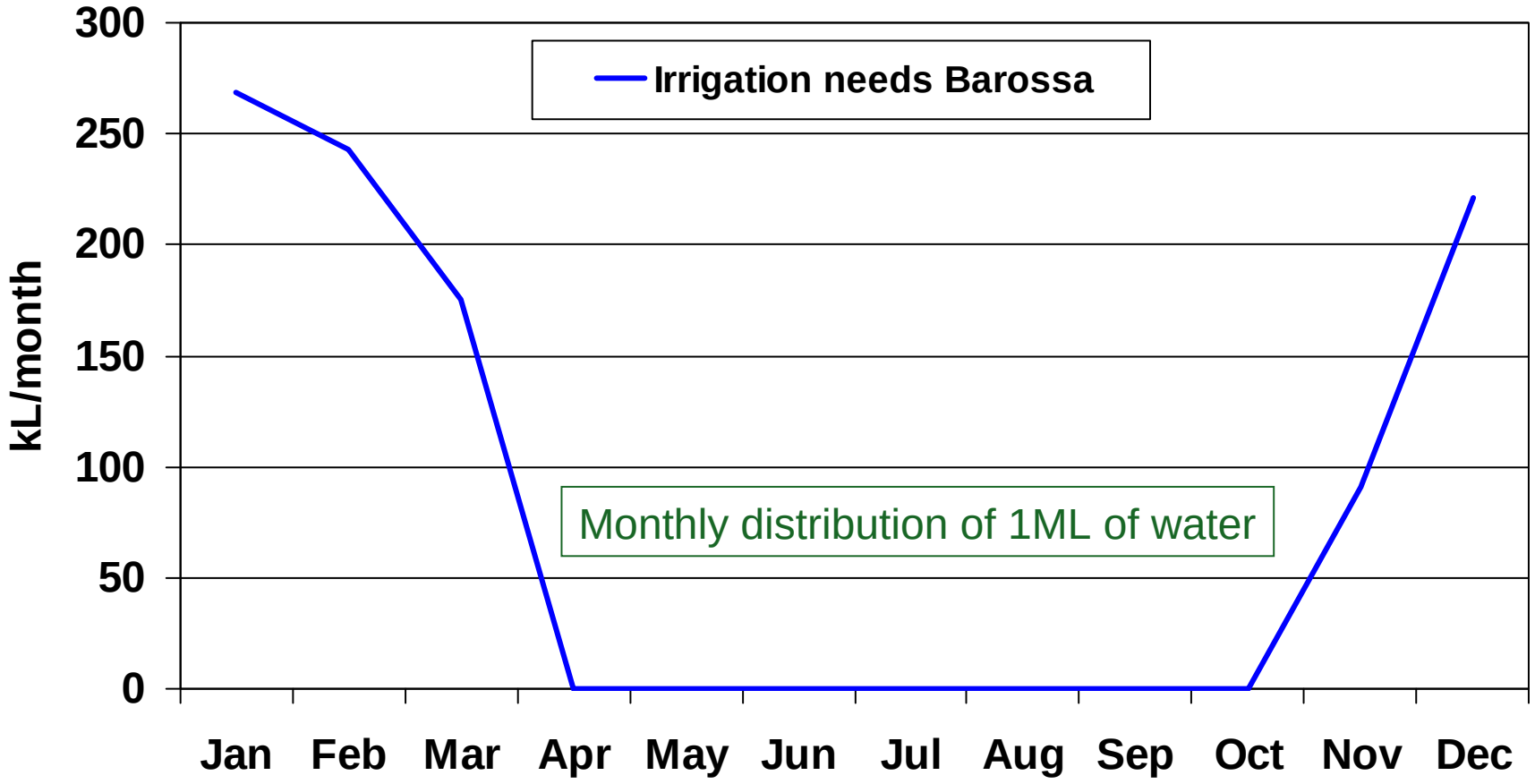
Need to talk briefly about treatment

- By treatment we are saying
  - Screen and settle to remove primary solids
  - Bio-Treat to remove soluble organic contaminants
  - Settle and filter to remove biosolids
- Treated water quality
  - BOD < 10mg/L
  - SS < 100mg/L (depending on filtration level)
  - EC < 2,000uS/cm
  - pH 7.5 – 8.5
- Storage of treated water allows reuse based on the user's requirements

For water reuse - Sustainability means meeting the plant and soil needs

- Plant needs for water and nutrients
  - Nutrients (N & P) are generally about right
  - Water requirements are high in summer and zero in winter

Water requirements of grapevines



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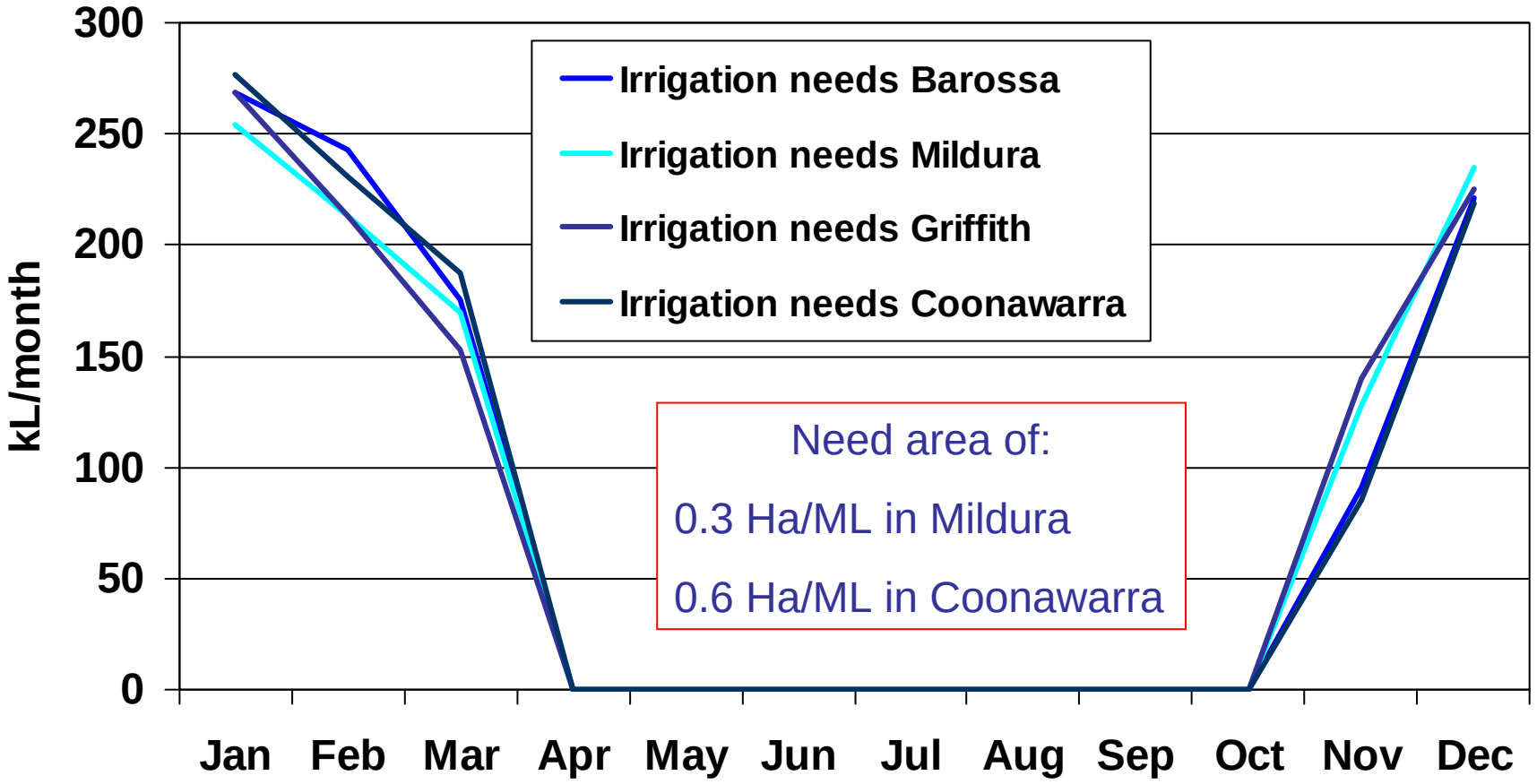
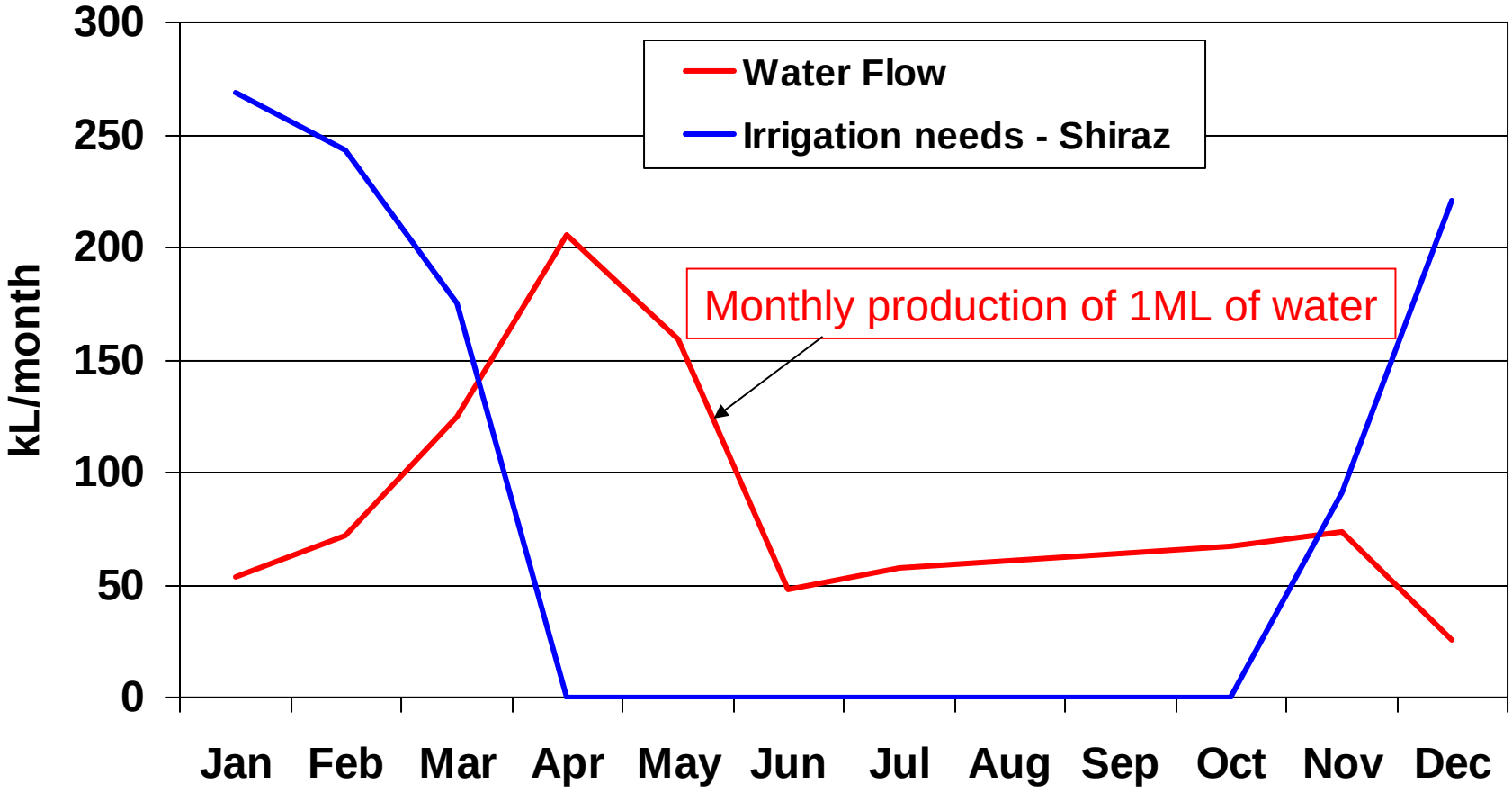


But the timing's all wrong..



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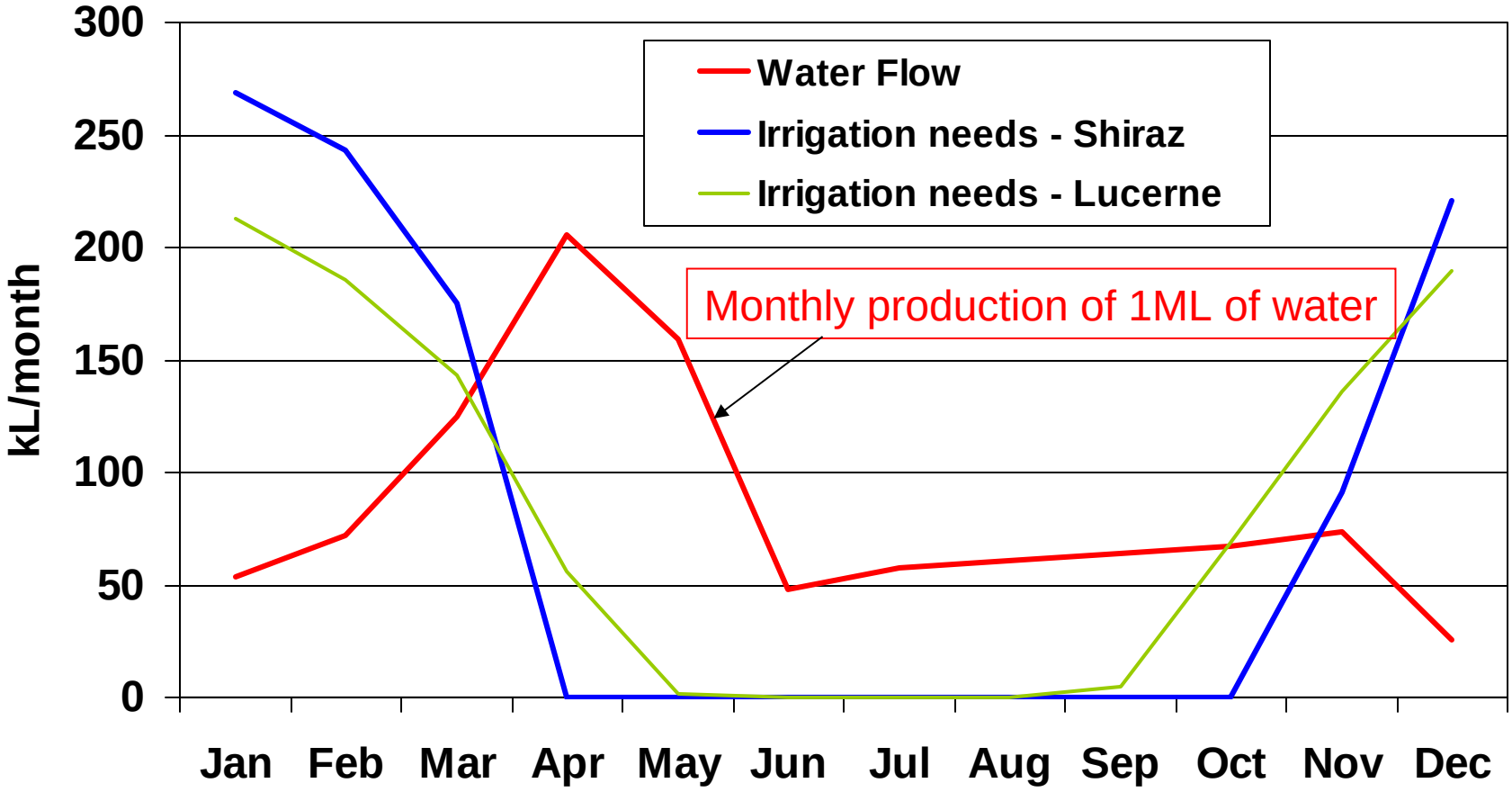
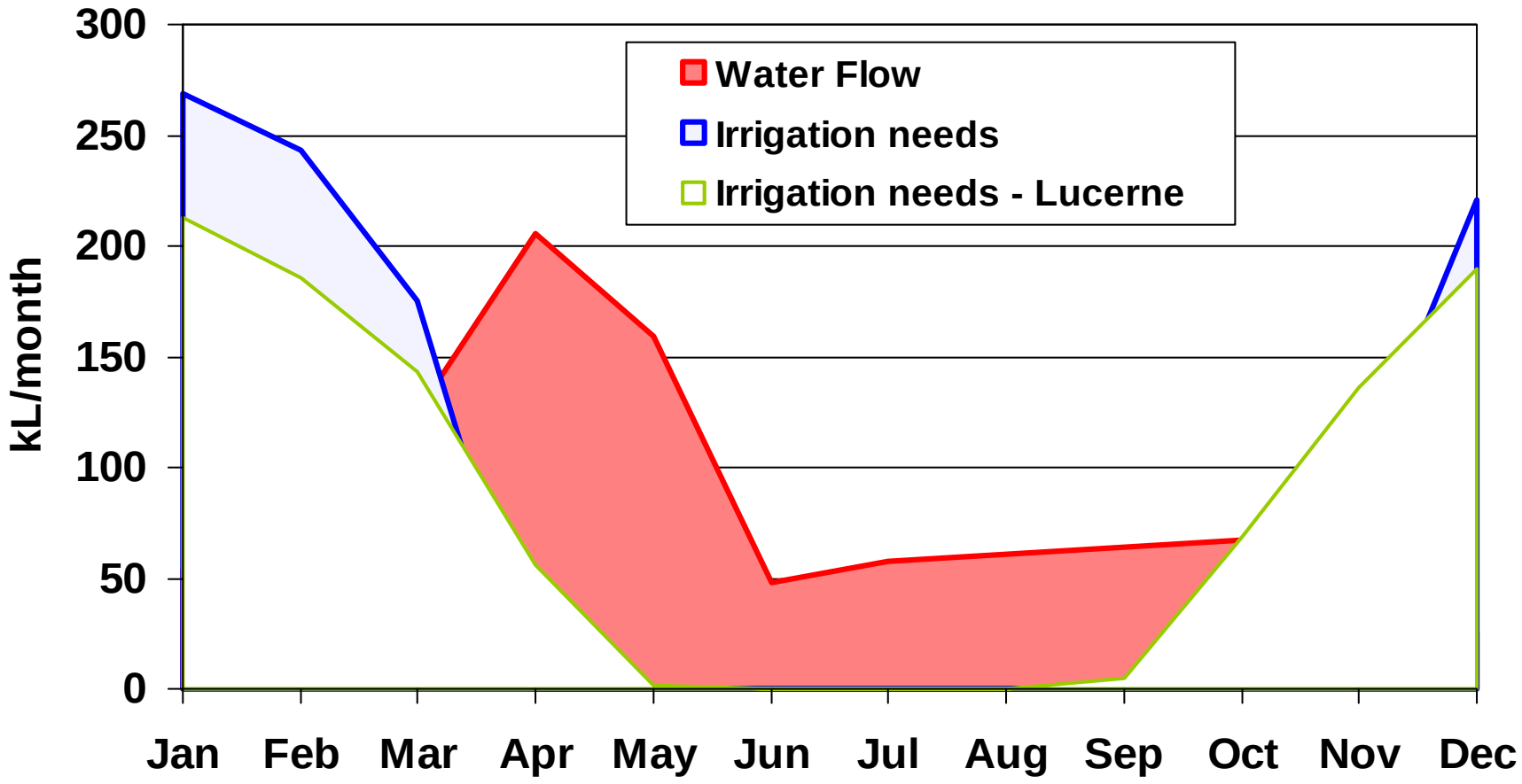


Excess water needs to be stored



Environmental issues that need to be considered

- Plant needs for water and nutrients
  - Nutrients (N & P) are generally about right
  - Water requirements are high in summer and zero in winter
- Salt levels may impact crop yield, soil health
  - Typically look to keep SAR below 6, need to keep Na out of the waste stream
  - K is an issue, but not sure about the extent
- Irrigation Management Plan needs to account for
  - Infiltration rates of soil – no waterlogging
  - Uptake of nutrients
  - No salinisation, structure loss, chemical contamination or erosion of soil
  - No effect on groundwater that will diminish future uses
  - EMP provides assurance

To Recap..

- Sustainability and waste minimisation are key principles
- Identify all water sources and needs – understand the total picture
- Assess water quality, treatment and monitoring requirements
- Conduct water and nutrient balances
- Incorporate Health & Environmental safeguards into an Irrigation Management Plan

<u>Case studies</u>

- Wirra Wirra, Casella, NPEC (Penfolds/Tarac)

Wirra Wirra

- 2,500 Te winery in McLaren Vale
- 6ML pa Mains (4.5ML) & Storm water (1.5ML) supply
- Waste treatment and disposal problematic

Wirra Wirra

- Built new aerobic treatment plant in 2006
- Treated water stored and reused for vineyard irrigation
- Additional winter storage dam (3ML) in 2007
- Allow neighbours to access treated water

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- 6ML pa Mains (4.5ML) & Storm water (1.5ML) supply
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Casella Wine Estates

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- Fastest growing winery anywhere
- Water supply
  - Mains Water supplied by Griffith City Council (GCC)
  - Channel Water also available from MIA
  - Security of supply is a real issue

Casella WWTP

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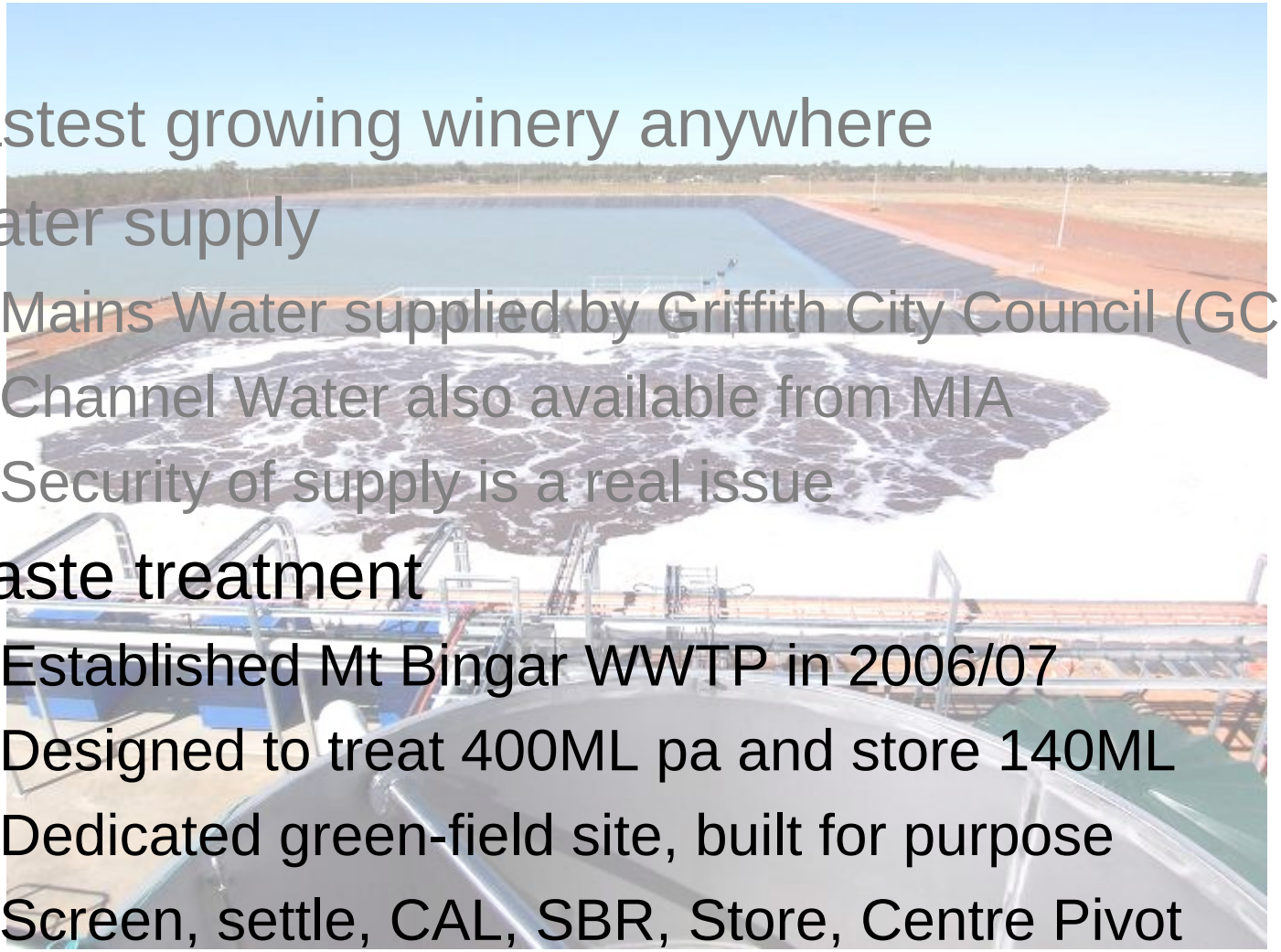
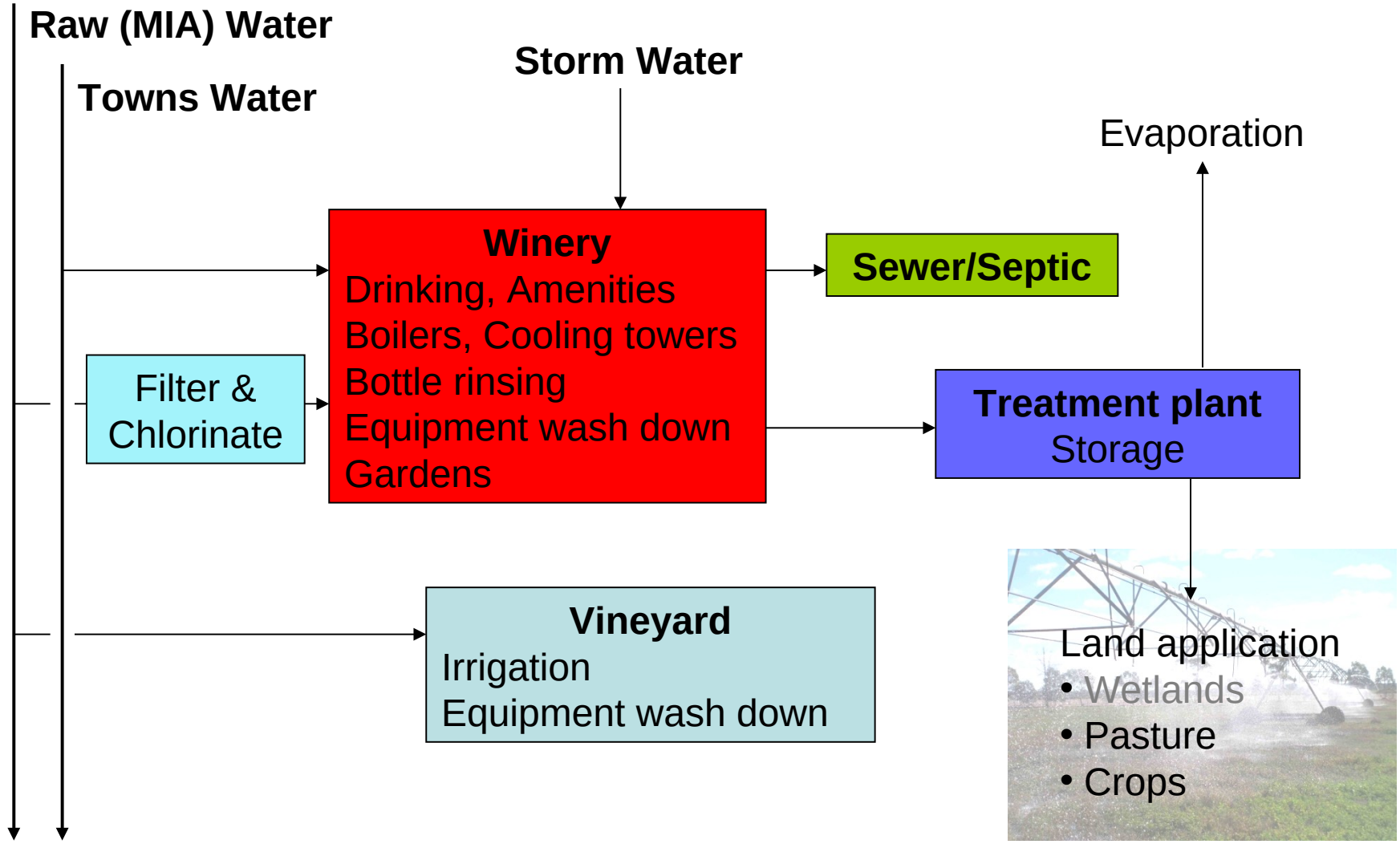


- Fastest growing winery anywhere
- Water supply
  - Mains Water supplied by Griffith City Council (GCC)
  - Channel Water also available from MIA
  - Security of supply is a real issue
- Waste treatment
  - Established Mt Bingar WWTP in 2006/07
  - Designed to treat 400ML pa and store 140ML
  - Dedicated green-field site, built for purpose
  - Screen, settle, CAL, SBR, Store, Centre Pivot

Water balancing - Casella



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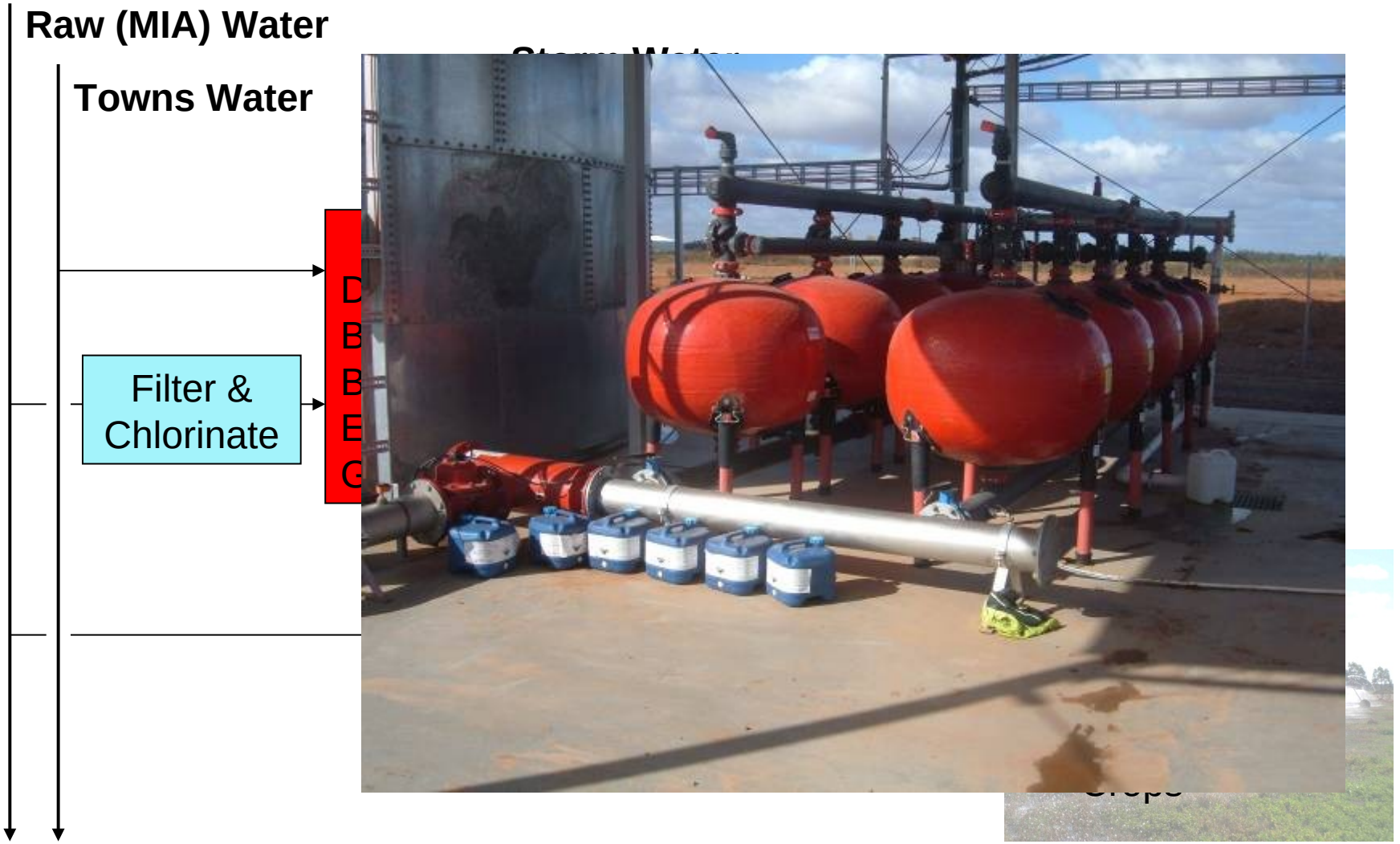

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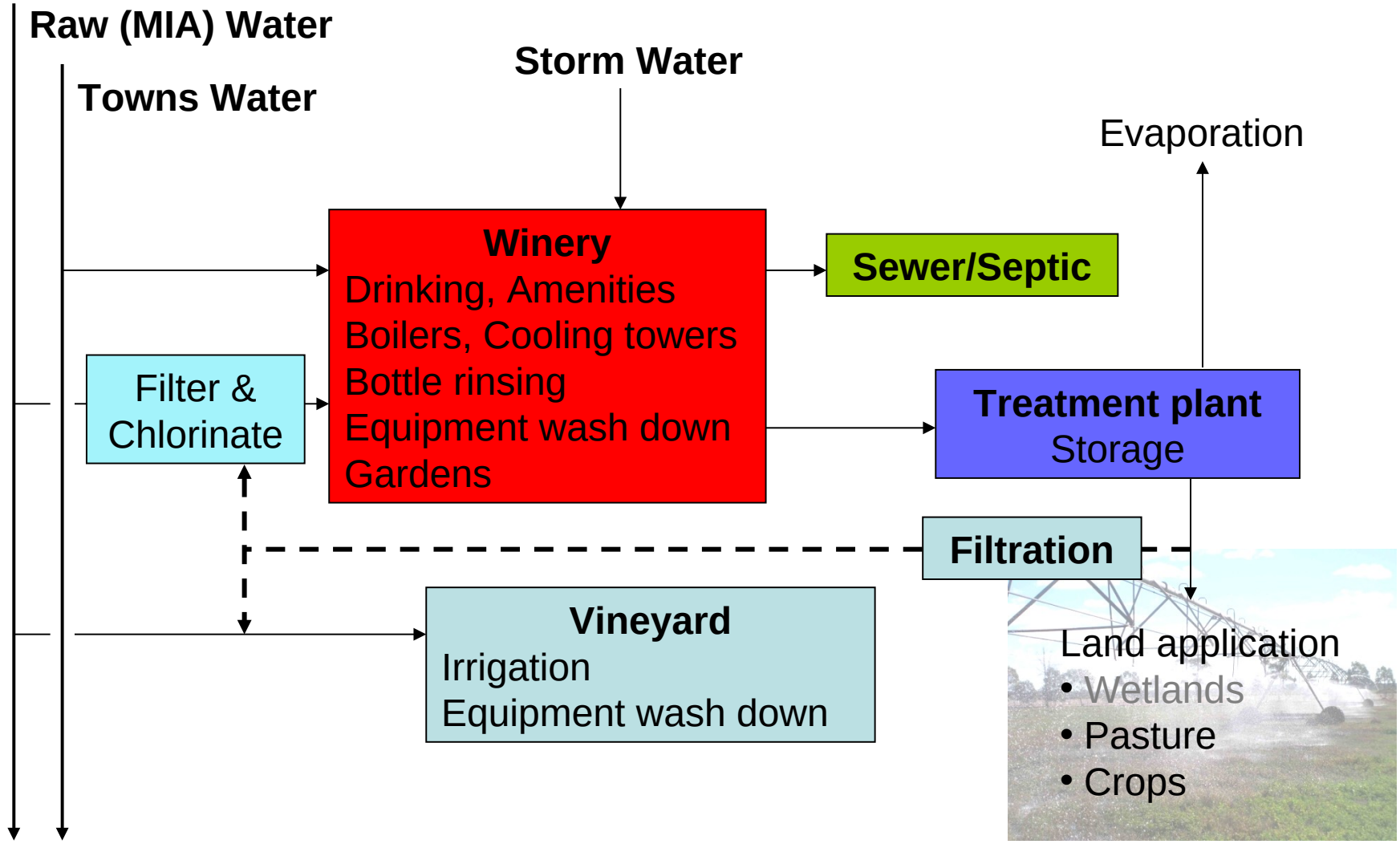

Penfolds/Tarac (NPEC)

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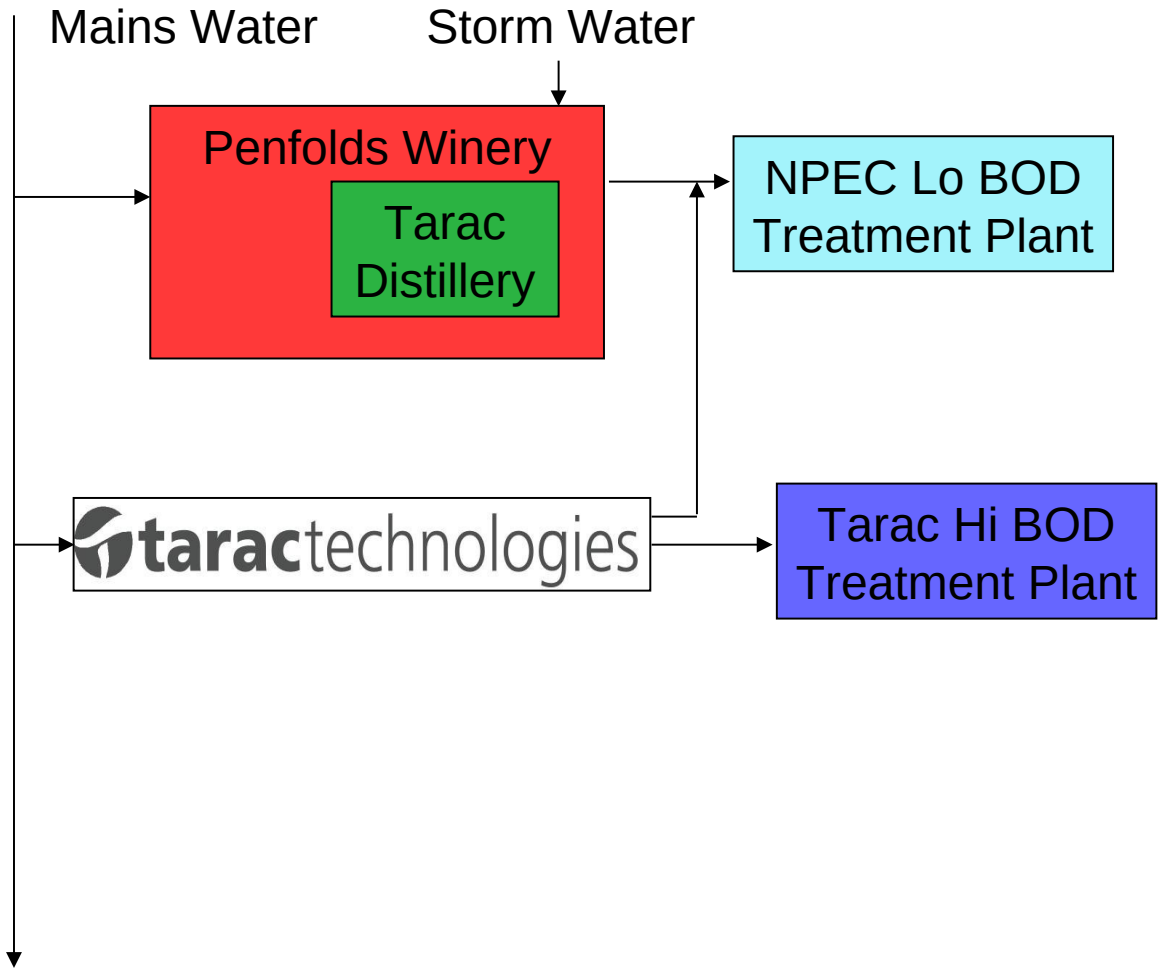
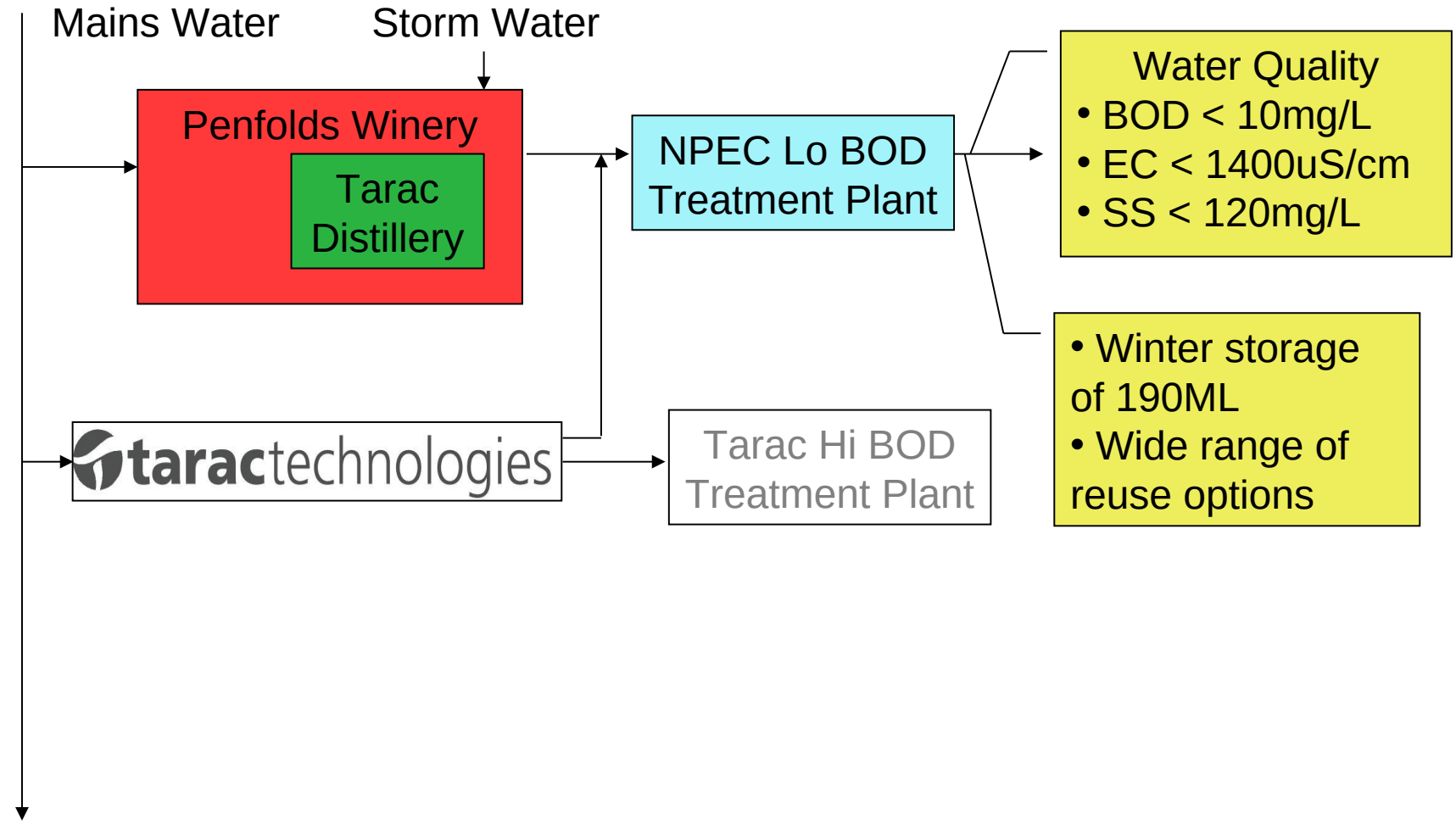
- 75Ha site in the Barossa (next to Tarac), 1.2kM pipe from Penfolds, established 1975
- Treatment plant progressively upgraded over the past 5 years – driven by Environmental Issues
- Segregation into two plants based on strength
  - Lo Strength (Fed from Winery, Distillery and Tarac Technologies)
    - BOD = 5,000mg/L, EC = 1,200uS/cm
    - 250ML pa, including 100ML pa harvested stormwater
    - Anaerobic/Aerobic treatment, media filtration pending
  - Hi Strength (Fed from Tarac Technologies)
    - BOD > 20,000mg/L, EC > 20,000uS/cm
    - 60ML pa into Anaerobic/Aerobic treatment
    - MF/RO recovers soft water for boiler feed

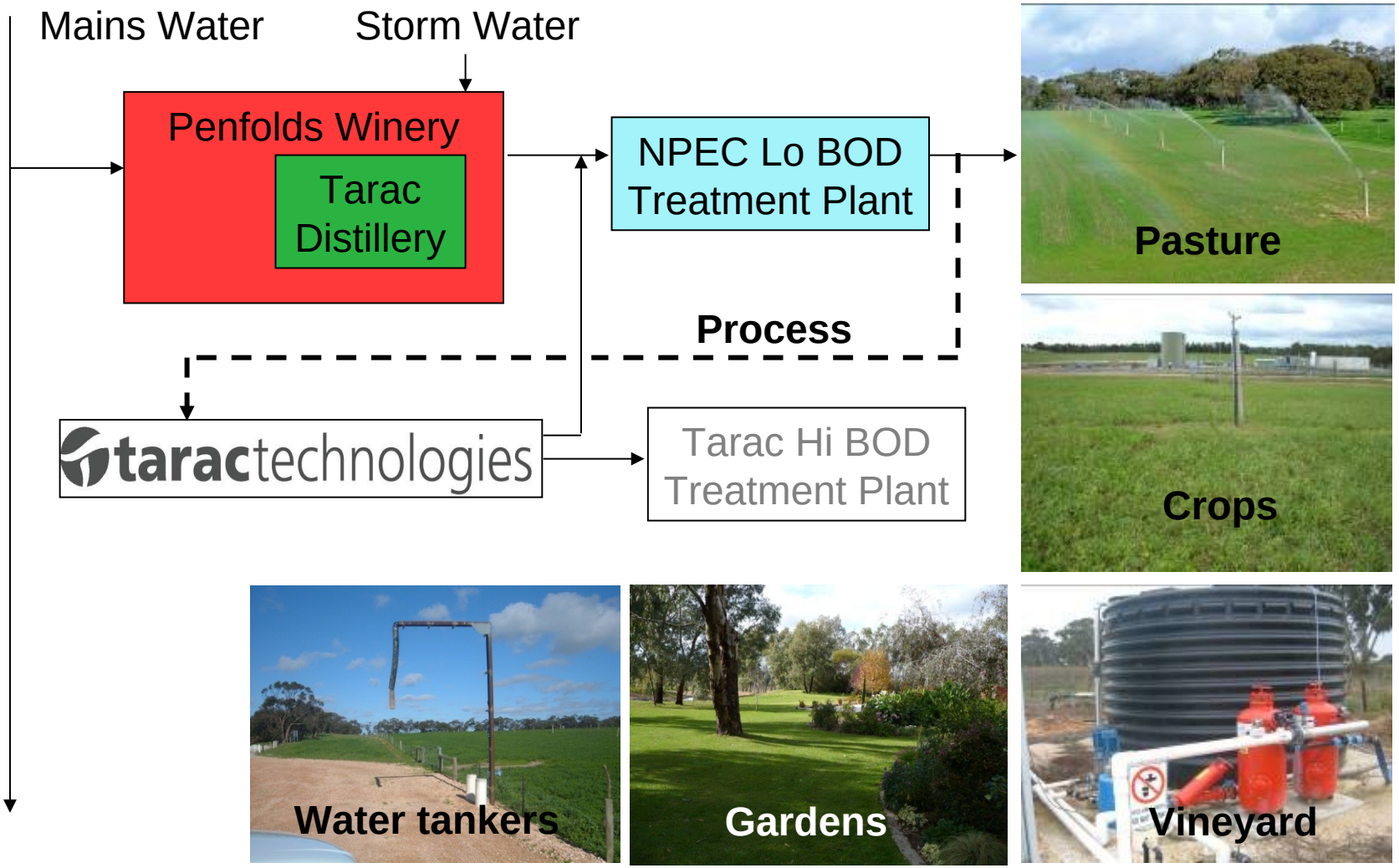
NPEC Schematic



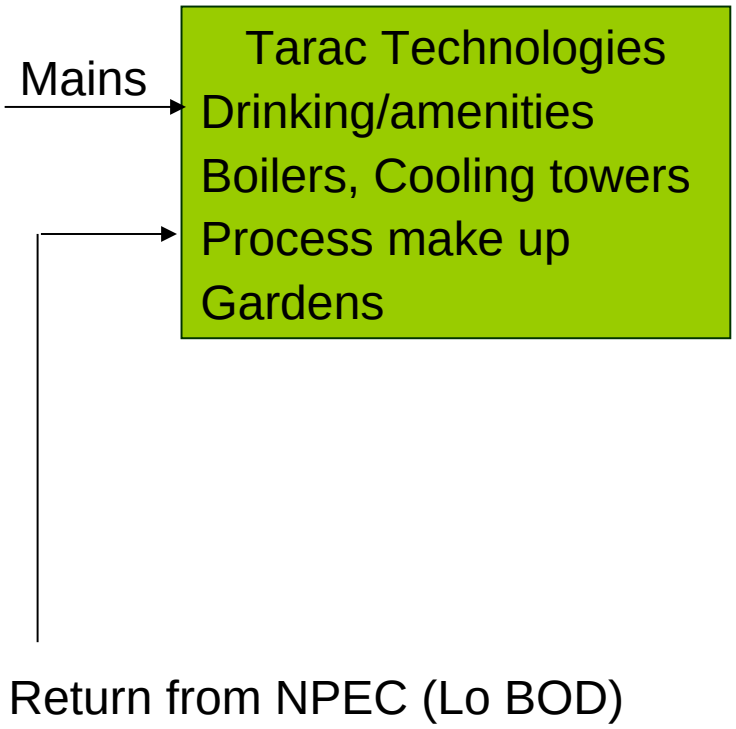
NPEC Schematic



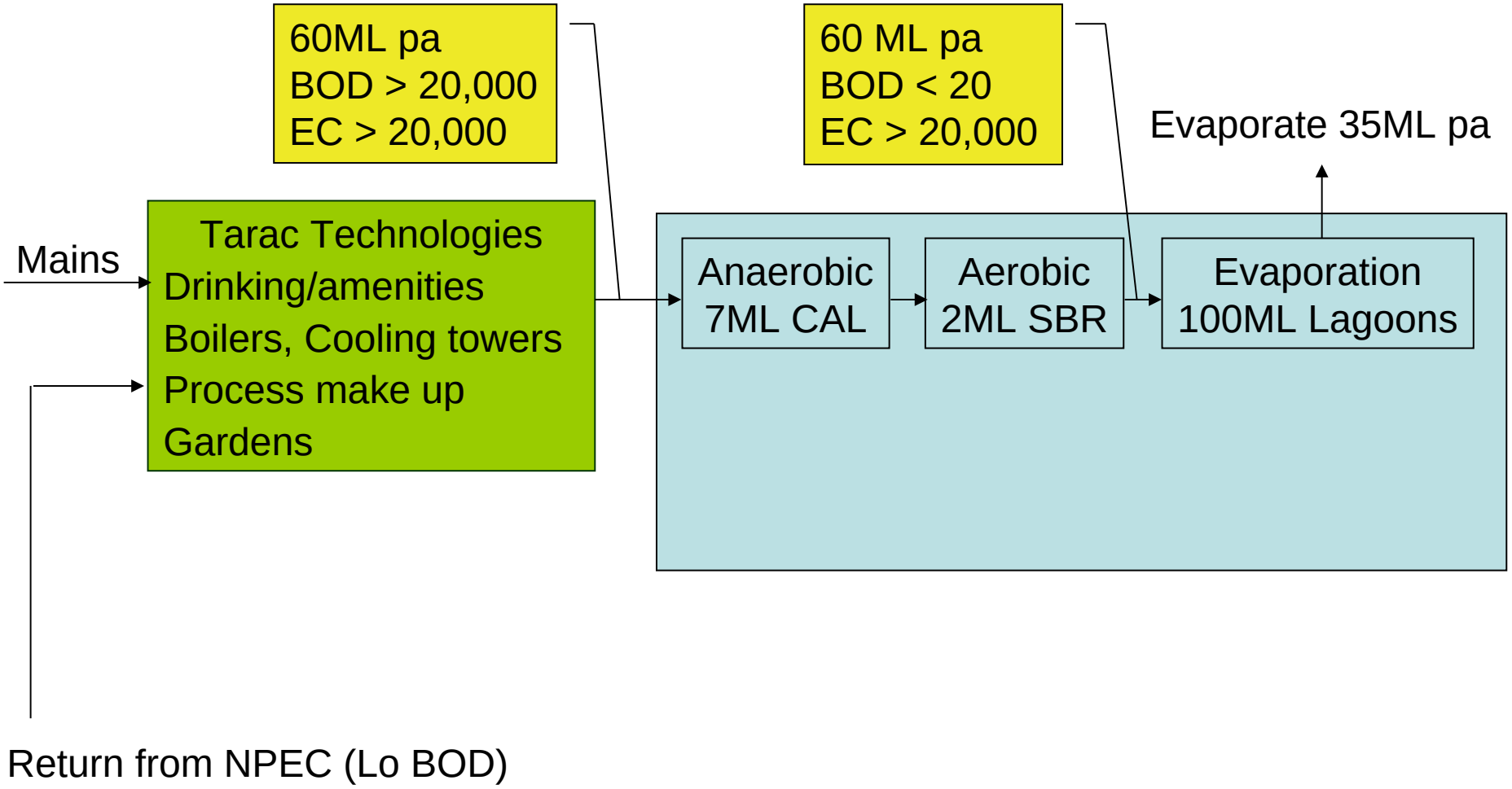
NPEC Reuse


Mains Water
Storm Water
Penfolds Winery
Tarac Distillery
NPEC Lo BOD Treatment Plant
Pasture
Process
taractechnologies
Tarac Hi BOD Treatment Plant
Crops
Water tankers
Gardens
Vineyard

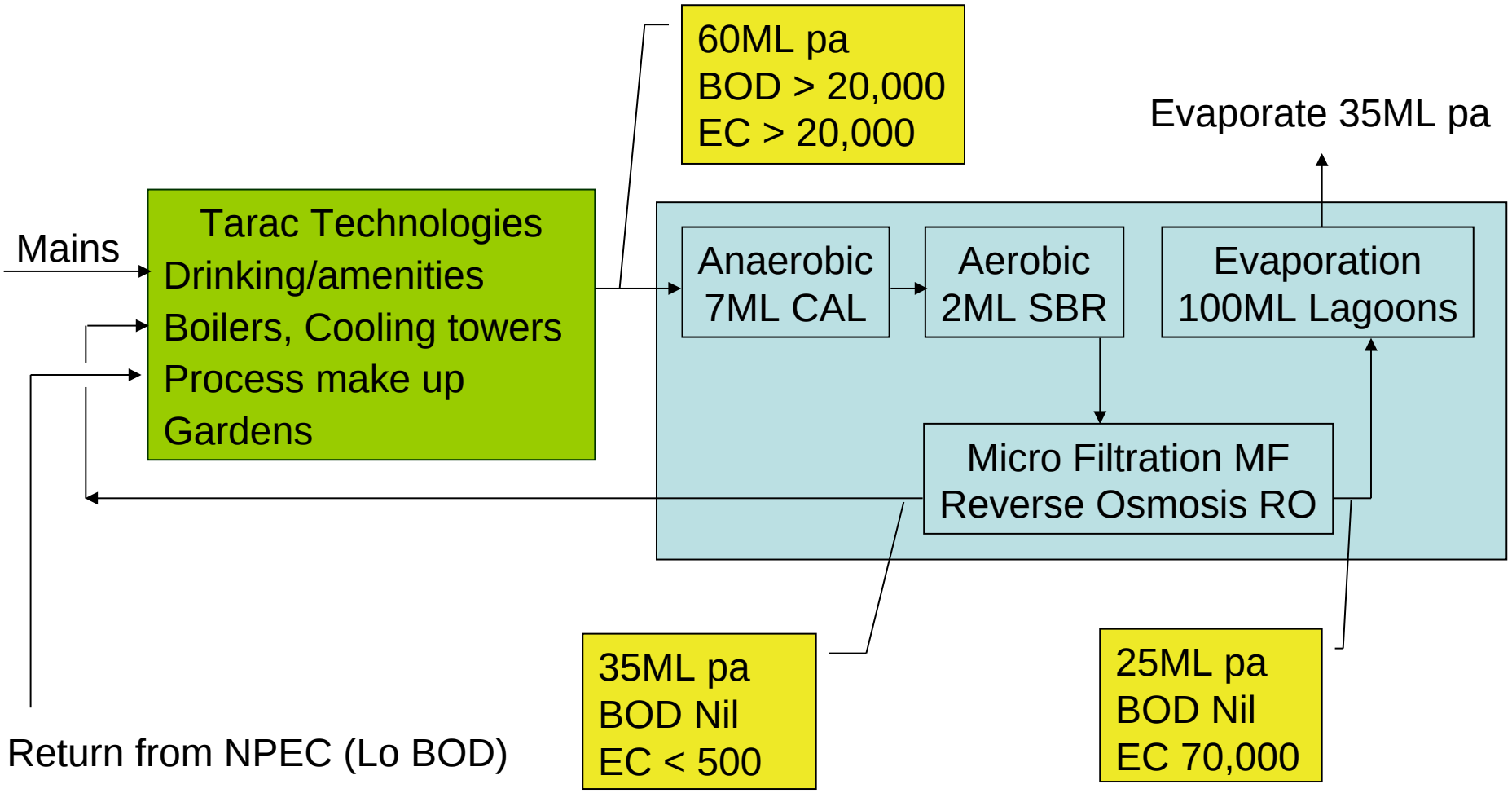
Tarac – Water Reuse



Tarac – Water Reuse

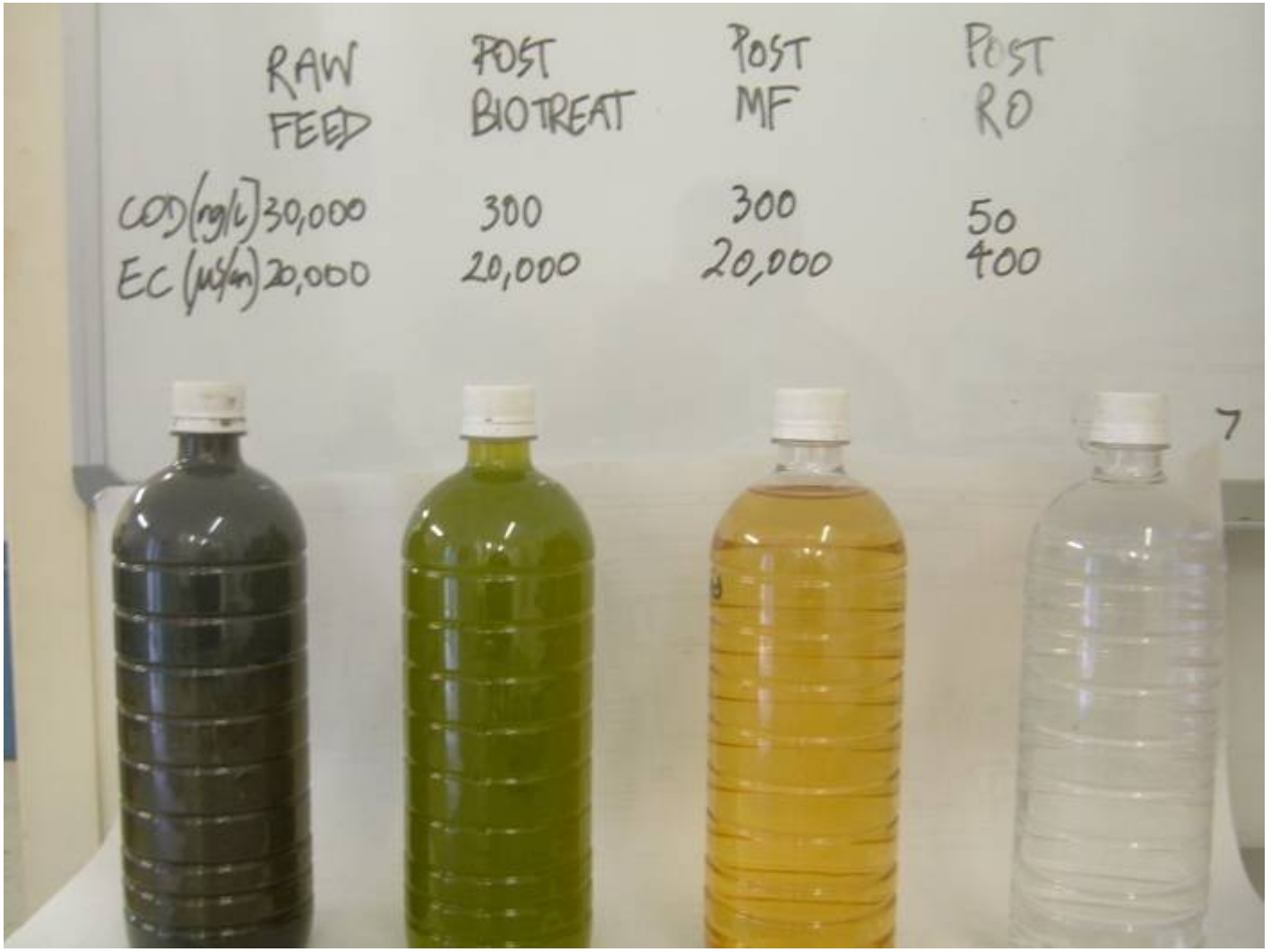


Tarac – Water Reuse



Tarac MF/RO

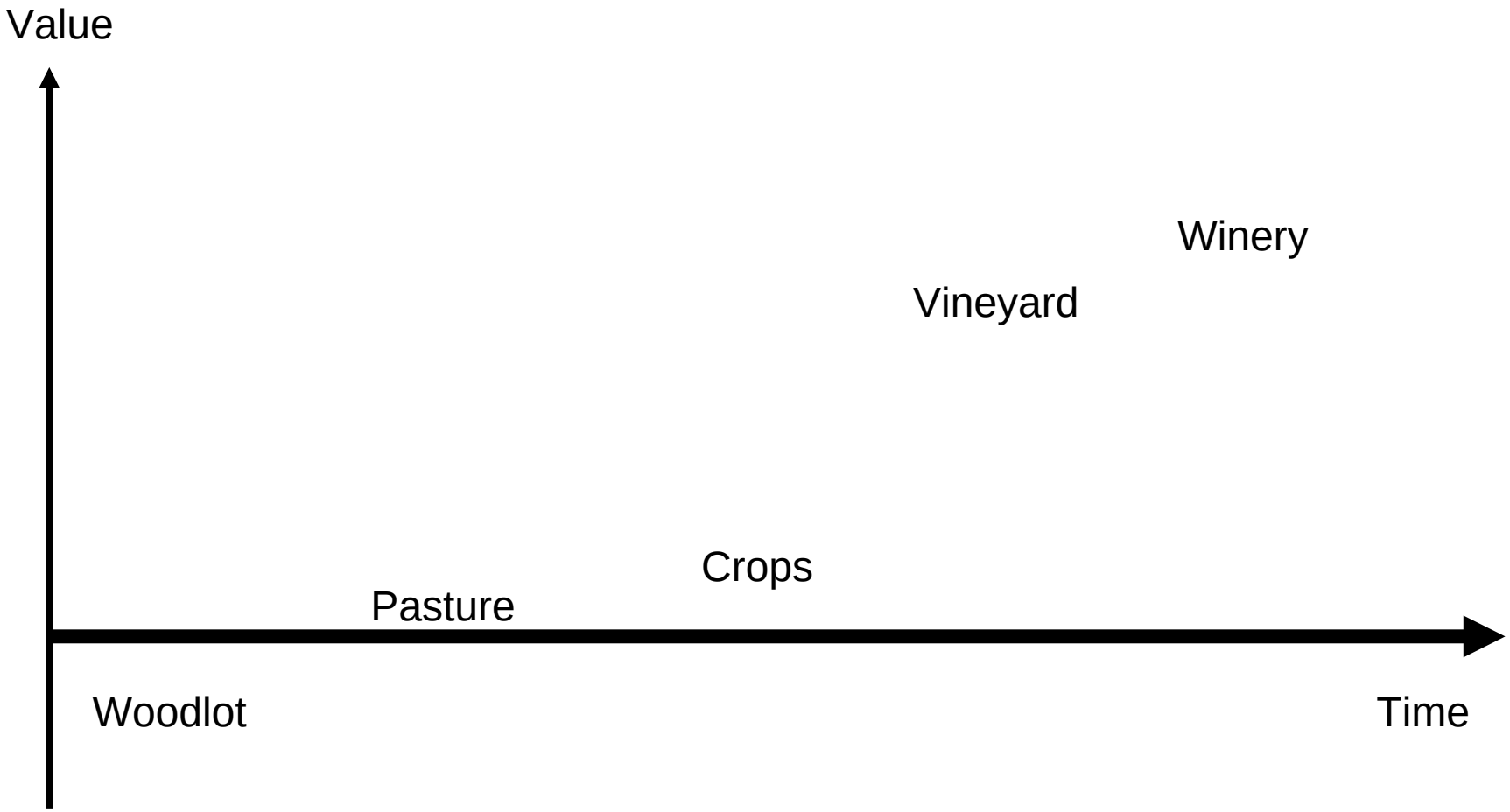
Tarac RO water samples



What have we learnt so far..

- It’s a Journey
  - Get an understanding of the big picture first
  - Progress one step at a time, there are new risks to negotiate, maintain options
- Upgrading treatment reduces environmental impacts, increases reuse opportunities

Progression to value adding



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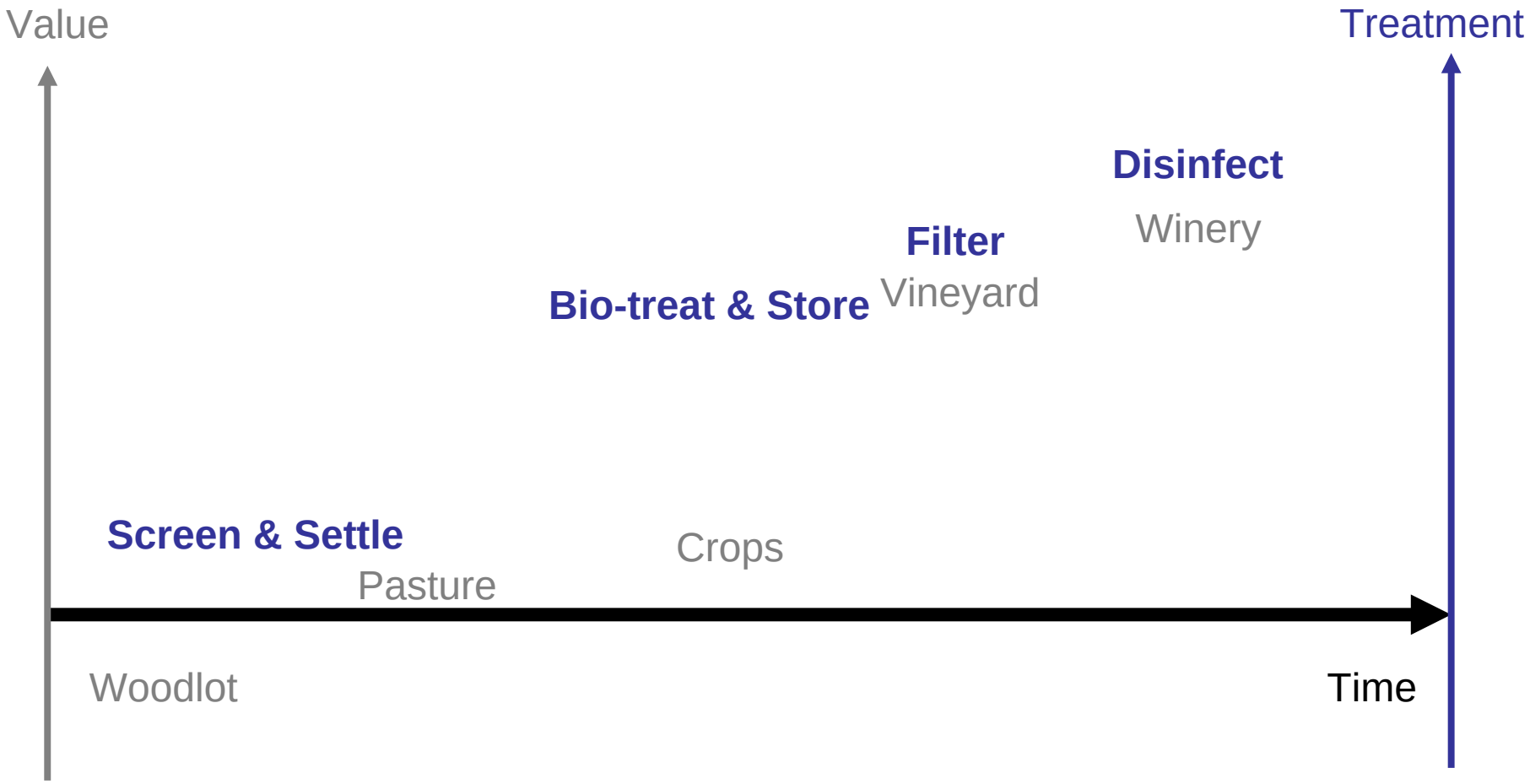

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  - Get an understanding of the big picture first
  - Progress one step at a time, there are new risks to negotiate, maintain options
- Upgrading treatment reduces environmental impacts, increases reuse opportunities
- Even the dirtiest of waste streams can be reused, the treatment technology is available
- Most issues are – "*How to Manage*"
- The motivation can vary
  - Remove environmental risks
  - Secure water for irrigation
  - De-bottleneck your process
  - Or just saving the planet