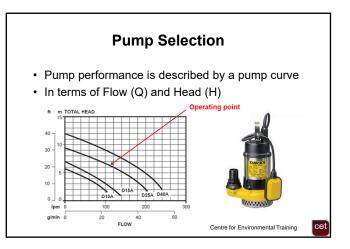
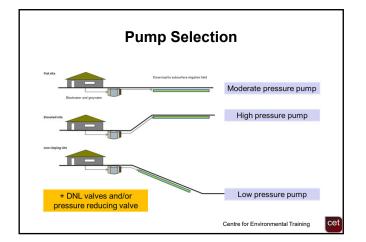


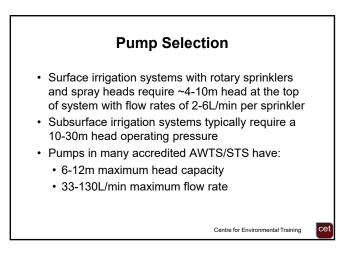
Pump Selection

- · Needs to be appropriate for wastewater
- · Made of non-corrosive materials
- Correct hydraulic duty (Flow (Q) and Head (H)) for actual operating point of the system
- Operating point needs to be as close to optimum efficiency point (mid-point on pump curve) as possible
- Need to determine appropriate operating point
- Affordability beware cheap pumps

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Pump Selection

- Sprinkler operating head + friction loss in the pipe commonly requires most if not all of the available head capacity (leaving limited capacity for static lift)
- Pumps supplied are often of insufficient capacity to uniformly irrigate correctly sized irrigation areas (based on appropriate DIR for soil type and/or water and nutrient balances), even when divided into a number of smaller sections or zones

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Pump Selection

- Uneven effluent distribution is a significant contributor to poor AWTS performance, or failure
- Irrigation area sizing requirements may create need for a bigger pump than typically supplied
- A one size fits all approach to pumps is not practical
- Pump should be selected to meet the specific requirements of each site

Filtration
Critically important
Protects irrigation system from blockages
Mesh filters low cost
Disk filters higher performance
Disc filters higher performance
Disc system
Neer

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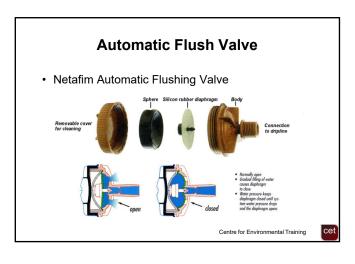
Filtration

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- Filtration of effluent is essential for effective irrigation
- Cylindrical mesh filters are usually sufficient for surface irrigation systems (typically 150 mesh, 100 micron rated filters)
- Disc filters better protect subsurface irrigation systems
- Need regular cleaning as part of each service
- If filter clogs frequently, need to investigate and solve treatment system problem

Flushing
Again, critically important
Scours potential blockages
Can return flush line to treatment system, or field flush to soak away (gravel pit)
Flush valves can be automatic or manual
Automatic flush flushes ~4 litres on start-up



Flushing Velocity

- Flushing velocity can be calculated using the continuity equation (part of hydraulic design)
- Must be sufficient to entrain air and sediment in lines and prevent build-up of slimes
- Dirtier water requires higher velocities
- Typically >0.8m/sec required for effluent
- Some driplines rated >0.3m/sec

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Distribution System

- Mainline to field
- · Indexing / sequencing valve
- Manifold
- Laterals
- Drippers or sprinklers
- Air valve / vacuum valve
- Dripper line non-leakage (DNL) valves
- · Flush valve / Field flush / Flush return line

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Mainlines, Submains, Manifolds

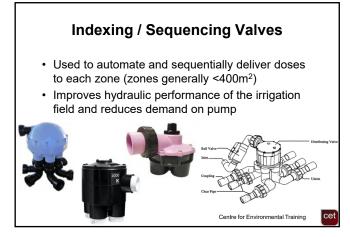
- Typically 25mm ID or larger diameter LDPE or PVC lilac piping
- Manifold and laterals should be buried
- Older systems may sit on ground surface
- Most Councils now require burial
- Surface exposure increases potential for damage (e.g. mowers, animals) and degradation (e.g. exposure to UV)

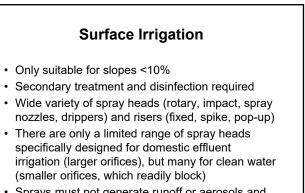


Mainlines, Submains, Manifolds

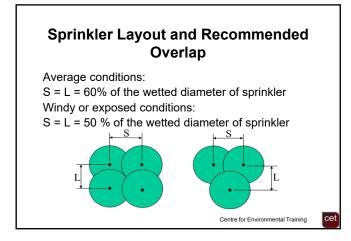
Pipe selection is part of hydraulic design. Need to consider:

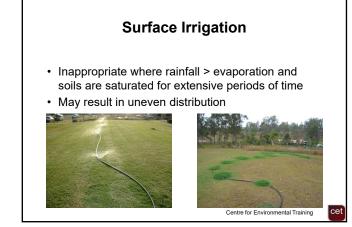
- Energy losses in pipe. Refer to manufacturer's charts or calculate
- Pressure rating AS/NZS requires pipes to be rated at 150% of the shut off head (of the pump)
- Appropriate wall thickness and depth of burial to protect pipe
- Consider cost, including fittings

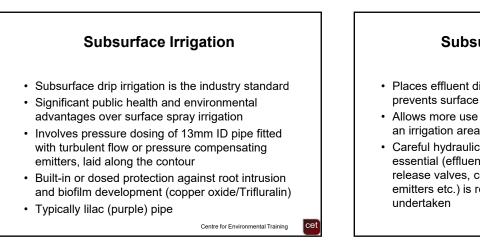




 Sprays must not generate runoff or aerosols and should have a throw and plume height suited to the site



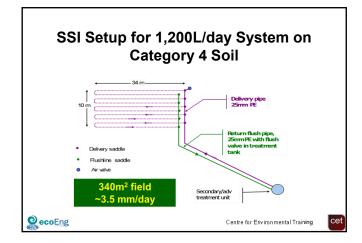


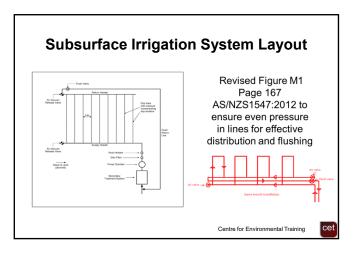




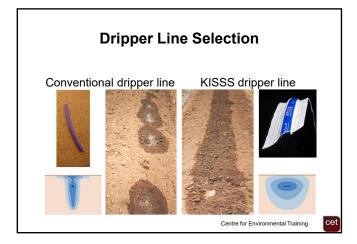
- Places effluent directly in the root zone and prevents surface runoff during rainfall
- Allows more use of and ease of maintenance of an irrigation area
- Careful hydraulic design, layout and installation is essential (effluent filtration, line flushing, vacuum release valves, correct spacing of laterals / emitters etc.) is required; though this is often not undertaken

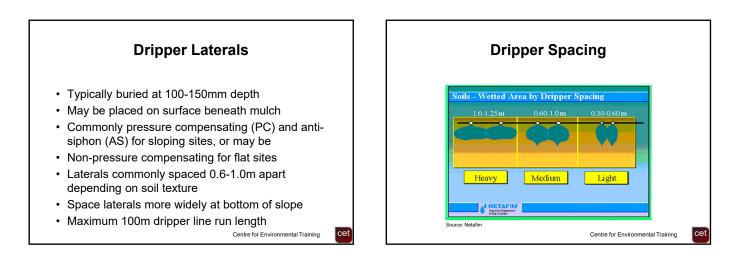
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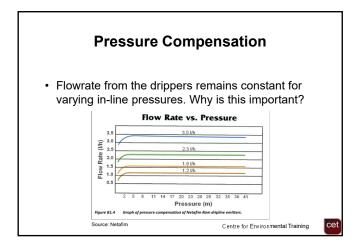


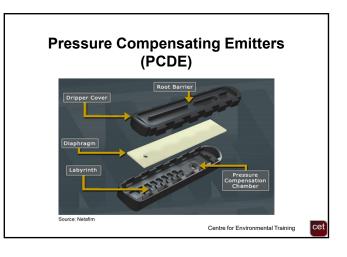


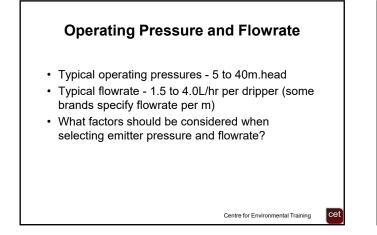


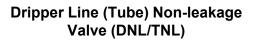






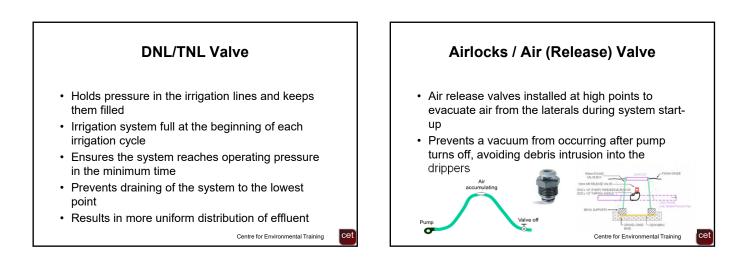


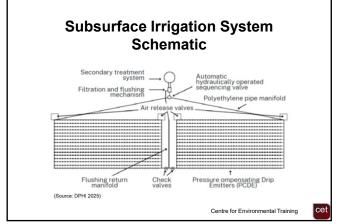




- Shuts off flow through the valve when line pressure drops below 2, 4 or 6m.head
- Opens and allows flow when the line pressure exceeds 8, 12 or 16m.head











- Check pumps and aerators
- · Fill pump well with clean water
- Pressure test all pipelines
- Check for leaks
- Check flush lines
- · Check alarm system
- System should be inspected by regulator at this stage, not before or after

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Management of Irrigation Systems

- No household fittings or end of pipe discharge
- Do not irrigate low growing crops which are not cooked before eating
- Avoid compaction by vehicular and animal traffic

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- Keep clear of sensitive receptors such as;
 - Clotheslines
 - Swimming pools
 - Barbeques
 - Children's play equipment
 - Open windows etc.

Operation, Maintenance and Servicing Manuals

- 1. For home owner
- 2. For servicing agent:
 - Flushing automated/manual
 - Regular monitoring and cleaning of filter(s)
 - Check for blockages, leaks and surface ponding
 - Monitor desludging requirements
 - Power outage procedures
 - Record keeping:
 - File as-built plans
 Record location of pipelines
 - Record location of pipelines
 Record failures and problems
 - Service report to Council and copy to owner

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Summary
Design requires understanding of:
Site specific details (soils, slope, flood and / or frost risk, landscape requirements, local regulations etc.)
Nature of effluent being handled
Equipment performance and interaction of components
Clear understanding of required outcomes
Careful hydraulic design required to match components and ensure even distribution