

Package Treatment Plant Operation and Management

Cessnock, NSW

8-9 June 2021

Package Treatment Plant Operation and Management

Variety of Systems

Mark Saunders

Introduction

In this session:

- Commonly Encountered Plant Configurations
 - Integral / Modular Package Treatment Systems
 - 'Commercial' Treatment Systems
- Additional Components
 - Tertiary Polishing
 - Nutrient Removal
 - Advanced Disinfection

What to expect in the field???

What is a Package Wastewater Treatment Plant?

- A 'Package Treatment Plant' can be described as any pre-fabricated or pre-engineered treatment system designed to accept and treat small to medium wastewater flows independent of a reticulated sewage system
- Typically receive an equivalent daily wastewater volume of between 10 EP and 2,500 EP (2,000L – 750,000L per day)
- Generic designs are available but most are tailored for a specific wastewater stream

What is a Package Wastewater Treatment Plant?

- Transported to site or constructed on-site from pre-fabricated materials
- Larger plants (>20,000L/day) may comprise complex design and require larger land areas to construct
- Plants for small commercial operations (subdivisions, caravan parks etc.) typically smaller with relatively simpler processes and operation
- Commonly found in one of three configurations:

Integral Treatment Systems

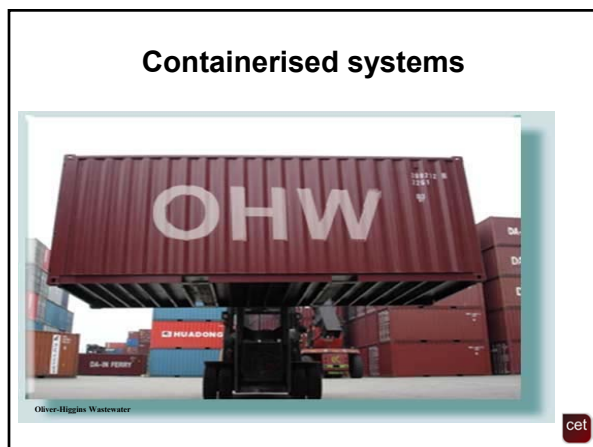
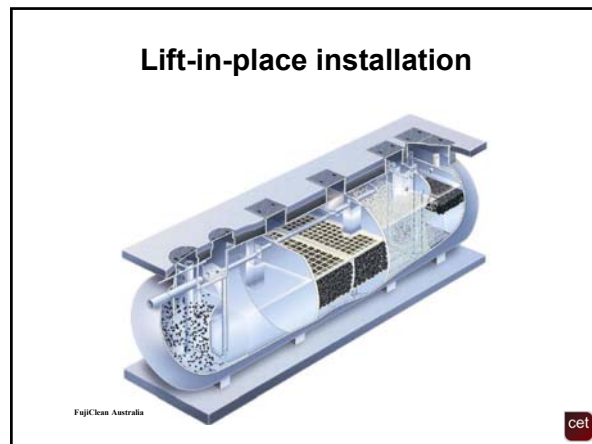
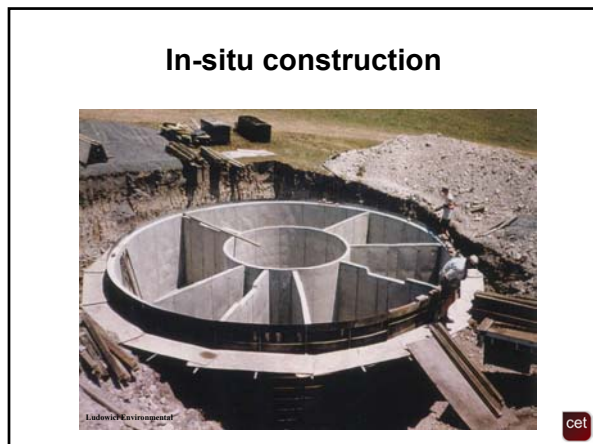
- **Integral** systems combine several treatment stages (unit operations) within one physical unit
- Smaller systems typically involve minimal on-site assembly or Site disturbance and can be connected to an existing sewage network relatively quickly (plug + play)
- Containerised systems available for short-term or versatile applications (e.g. mining camps)
- Larger system may include some in-situ construction with pre-fabricated componentry

Pre-fab design

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
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Modular Treatment Systems

- **Modular** systems provide each (or multiple) unit operations within a separate physical unit or structure
- Several discrete units are used to treat the wastewater load to the desired quality
- Treatment units may be spatially distributed throughout Site or used for pre-treatment of individual development components (decentralised)
- Also easily connected to an existing sewage network



Discrete Process Stages



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Tank Farm systems



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Modular Treatment Systems



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'Commercial' Treatment Systems

- Systems designed originally for residential wastewater treatment may also be applied to (larger than domestic) wastewater situations (i.e. hostels, short-stay accommodation etc.)
- **Commercial** systems are often configured to include 'flow balancing' to moderate wastewater distribution to several domestic treatment devices installed either in series or parallel
- System development may be ad-hoc
- Appropriate system/component sizing can be a concern

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In-series design



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Split-load systems



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Split-load systems



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Scaled systems



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Additional Treatment Components

- Systems may also include additional treatment processes downstream of the plant
- Commonly required for:
 - systems that discharge to surface waters or in proximity to sensitive receptors
 - systems within drinking water catchments
 - systems irrigating effluent where primary contact or human consumption is a possibility
- Some discussed in greater detail later

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Tertiary Polishing

- Media Filters (i.e. RSF, Fabric or multi-media)
- Membrane Filters
- Biological systems (i.e. reed beds, ponds)



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Nutrient Removal Systems

- Amended PBR's (e.g. Ecomax)
- Selectors
- Denitrification Bed or Trench
- Adsorption systems (e.g. peat filter)



Landcare: Louis Schipper

Denitrification trench

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Disinfection Systems

- Tablet chlorination most common
- Other methods may include:
 - Liquid/gas chlorination
 - Chloramination
 - UV
 - Ozone



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Liquid Chlorine dosing



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Control Systems

- Treatment plant operations may be managed by a range of control and monitoring systems, including:
 - Timer control units (e.g. analogue timers)
 - Simple integrated control panels with feedback from sensors (e.g. float controls)
 - Programmable Logic Control (PLC) systems (stored programs, feedback, response and data recording)
 - Supervisory Control and Data Acquisition (SCADA) – software based control interface for managing multiple monitoring and control systems

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Integrated Control Panel



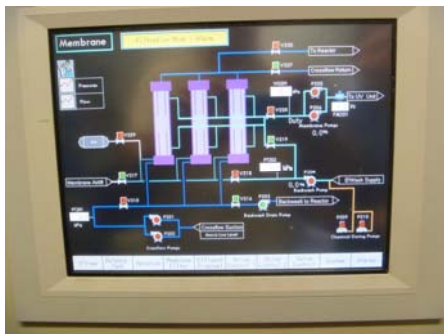
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PLC Systems



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SCADA Systems



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What to Expect in the field?

“Identifying unit components and process linkages”

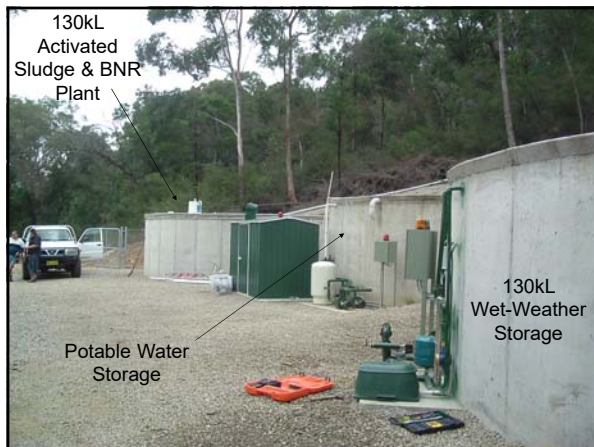
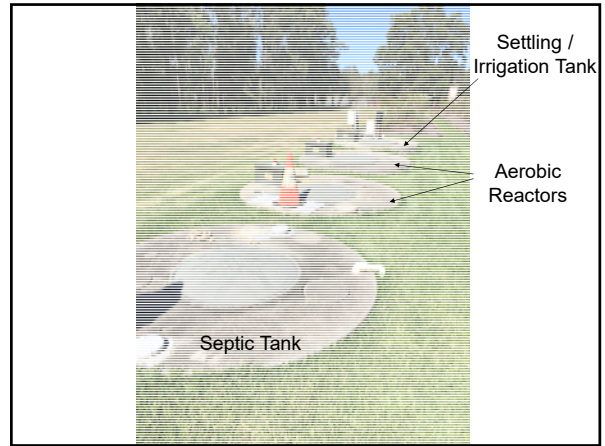


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