ETP Sludge Digestion Capacity Upgrade
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Eastern Treatment Plant

- ADWF: 350 ML/d (2.2m PE)
- PSTs, ASP, Tertiary Treatment
- PS (110 t/d), WAS (65 t/d) pre-thickened, fed to 8 no. MADs:
  - 7700 kL
  - Gas Mixed (>95% active)
  - 2.5% TS
  - 15d HRT @ 37°C
  - VSD ~55%
- Digested sludge to drying pans
- Biosolids stockpiled/opportunistic reuse (C2 T1)
Option Selection: Process

• Context:
  – Digesters last upgraded 1995
  – Developments in digestion and pre-treatment

• Single/multi-phased digestion, pre-treatments, thickening

• Criteria:
  – Whole of Life Cost (NPC)
  – Operability, maintainability
  – Risks – safety, construction, process
Option Selection: Site-Specific Factors

- T1 grade via stockpiling (3 yrs)
- Existing process complexity
- Asset age/condition
- Recalcitrant organics: UVT, ozone demand
Recuperative Thickening

• Benefits:
  – Superior NPV
  – Faster implementation, potential for staging
  – Operational flexibility, low process risk
• SRT decoupled from HRT (15d target)

• Extensively used at Sydney Water WWTPs

• Visits to: Liverpool, Warriewood, Melton, Mt Martha

• RDTs selected
Bench Scale Digestion Testing

• Site-specific sludge properties

• To improve understanding of:
  – RT (current upgrade)
  – THP (future option)

• Parameters:
  – Process performance: VSD, dewaterability, rheology
  – Risks: Odour (TVOSC), ozone demand

Chilling samples for air freight to Brisbane
• Implement RT to maximum extent feasible

• Digester sludge thickness increasing; limitations imposed by existing assets:
  – Pumping ("Fathom" network model)
  – Mixing (CFD modelling)
  – Heating

• Sewage sludge rheological testing:
  – Complex, non-Newtonian behaviour
  – Site-specific
Staged Implementation

<table>
<thead>
<tr>
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<th>Stage 1</th>
<th>Stage 2</th>
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<tbody>
<tr>
<td><strong>Design Thickness</strong></td>
<td>3.5%</td>
<td>4.0%</td>
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<tr>
<td><strong>Design Year</strong></td>
<td>2027</td>
<td>2036</td>
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**New Equipment**
- RDTs (6 no.)
- RDTs (4 no.)

**Upgraded Equipment**
- **Pumping**
  - Pump replacement/booster
  - PS for withdrawal to SDPs
- **Mixing**
  - Digester 1-4 mixing upgrade
- **Heat Exchangers**
  - Digester HEX (3 no.)
  - Raw Sludge HEX (2 no.)

**Flexibility:**
- Stage 2 timing (performance, load growth)
- Alternative technologies
- Sidestream deammonification (centrate)
Conclusion

• Site-specific factors – process configuration, existing assets, sludge characteristics, capability

• Experimental testing and modelling to explore limitations

• Looking outward, learning from other utilities

• Challenging application of RT – integration complexity, pumping

• Staged approach – flexibility

• Thanks:
  – Colleagues at ETP
  – GHD, AWMC, CH2M, RCS
  – Sydney Water, Western Water, South East Water