

**SUMMARY OF FINDINGS**

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**Treatment and monitoring of nutrients, odour and sludge at a small-town demonstration wastewater treatment system**

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The design requirements for the decentralised treatment of wastewater from small towns with population equivalents (PEs) in the range 200–2,000 PE are commonly different to those encountered in the treatment of wastewater from larger conurbations. In order to develop design guidelines for small-town wastewater treatment systems, a world-class water research facility (WRF), capable of examining proprietary and novel environmental technologies, was proposed, designed, constructed, commissioned and operated by researchers in Civil Engineering, NUI Galway at Galway County Council's Tuam Wastewater Treatment Plant (TWWTP) and is known as the NUI Galway/EPA WRF.

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**Key Words: Water research facility, decentralised wastewater treatment, technology development, fundamental and applied research, remote control, operation and monitoring, sludge treatment, Water Framework Directive, Urban Wastewater Treatment Directive**

**Background**

Decentralised wastewater treatment systems for small towns (200 – 2,000 PE) often have different design requirements to those of systems for larger conurbations even though the treatment process technologies may be similar. For example, additional design requirements at decentralised small systems may include: (i) flow balancing; (ii) long-term on-site sludge storage; and (iii) infrequent supervision and remote monitoring. To meet the requirements of the EU Water Framework Directive, wastewater treatment systems for small towns should: (i) be simple, sustainable and robust, and cheap to construct and operate; (ii) reduce fats, oils and greases; (iii) remove organic carbon, nutrients (N and P) and solids; (iv) decrease microorganisms; (v) treat resultant sludges on-site or locally; and (vi) be monitored and controlled remotely. The NUI Galway/EPA WRF was created to assess and develop such wastewater treatment systems for small-towns.

**Key points**

The NUI Galway/EPA WRF provides a unique research facility for:

- Developing and testing technologies for water, wastewater and sludge treatment;
- World class applied and fundamental research;
- Increased opportunities for successful research funding proposals;

- Education and training of graduate, postgraduate and post doctoral researchers;
- Increased collaboration between industries, research and policy institutions;
- Public education, technical education and training of stakeholders;
- High profile information dissemination on environmental technologies;
- Policy planning; and
- Attracting visiting academics and students from leading international institutions.



### Findings/Recommendations

- Novel, low-energy pumped- and horizontal-flow NUI Galway developed biofilm technologies were proven to meet stringent EU standards over an initial 12 month test-period for organic carbon and nitrogen removal from municipal wastewater. Maximum removal efficiencies were as follows: pumped flow » 96 % BOD<sub>5</sub>, 93 % SS and 97 % NH<sub>4</sub>-N; horizontal flow » 97 % BOD<sub>5</sub>, 75 % SS and 95 % NH<sub>4</sub>-N.
- Novel NUI Galway woodchip filters effectively removed solids from waste activated sludge (maximum removal efficiencies: 99 % SS, 97 % BOD 84 % TN and 88% NH<sub>4</sub>-N).
- World-wide opportunities exist for new, robust, sustainable and low energy technologies and management systems for wastewater, water and sludge treatment.
- When designing or upgrading decentralised wastewater systems, the sewer system, infiltration flows and all influent loads should be comprehensively examined.
- Extensive monitoring, analysis and reporting of influent wastewaters during storm and dry weather flow periods lead to improved plant design and operation.
- Designs should consider possible underloading of many treatment technologies as this can significantly affect plant biology and reduce performance efficiencies.
- As many small-town plants don't have full-time operators, equipment should be robust, easily maintained and readily replaceable. Operators should be able to remotely monitor a number of treatment facilities from a central location.
- Technologies that locally treat and dispose of sludge should be investigated.

### **For Further Information**

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<http://www.epa.ie/researchandeducation/research/projects/tech/>

### **Publications connected to this work (References)**

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