# Impacts of septicity on wastewater treatment

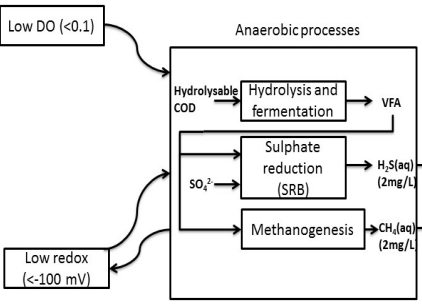Julen Mendizabal, Ana Soares, Bruce Jefferson, Ben Martin and Dejan Vernon

# Stream
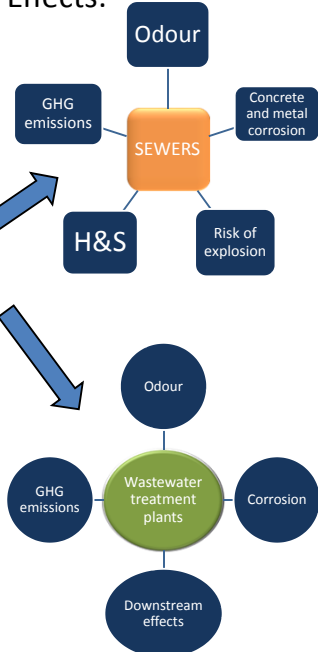## The Industrial Doctorate Centre for the Water Sector

## 1. The problem

**Septicity process:**

Unintended anaerobic processes which generate $H_2S$ and other volatile compounds
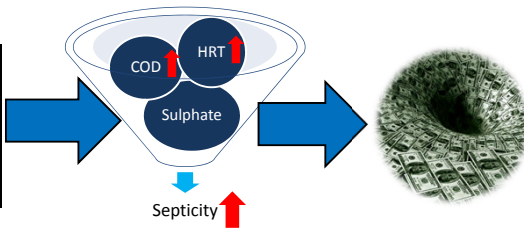
Effects:





**The future:**

Lower water consumption strategies increase septicity potential



## 2. Aim

**To understand the mechanisms governing septicity in wastewater treatment plants as well as the effect on processes and management.**

## 3. Batch tests

Sewage and sludge samples anaerobically incubated to monitor the changes in potential indicator parameters and create a septicity scale

| Potential indicators | |
|---|---|
| DO | Ammonia |
| pH | Nitrate |
| ORP | Nitrite |
| $H_2S$ (aq) | Methane (aq) |
| $SO_4^{-2}$ | Methane (g) |
| VFA | $H_2S$ (g) |
| sCOD | Fluorescence |
| Odour (e-nose) | |



VFA changes in sewage
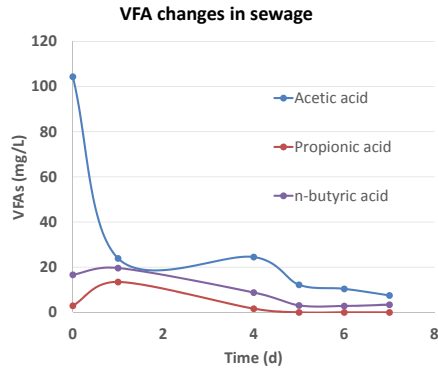
Fluorescence EEMs for sewage



Time 0



12 days



Experimental set-up
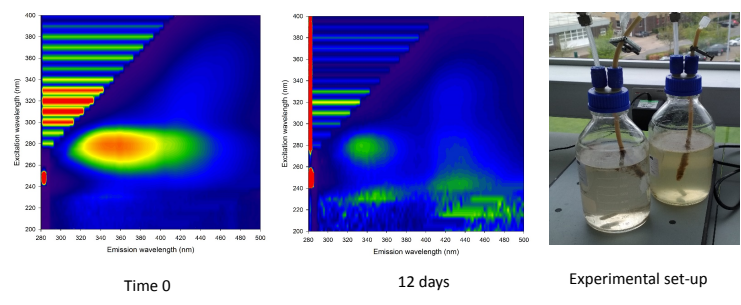
## 4. Next steps

**Quantification of downstream effects:**

The effect of different septicity levels on different treatment technologies will be quantified by pilot trials and field measurements. The results will be converted to a operational risk matrix

| Septicity level | Operational (X, Y, Z) | Odour | Health |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |

Example risk matrix for primary sedimentation

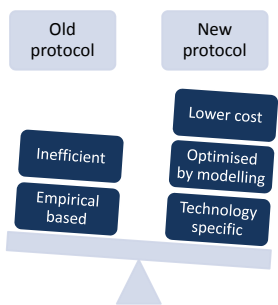**Identification of promising management options:**

Different management options will be tested for different septicity levels and depending on their effectiveness the most economic will be selected for each case

Example protocol for primary sedimentation

| Influent septicity level | Management option | Cost (£/m³) |
|---|---|---|
| 1-2 | No action required | - |
| 3 | Desludge tank | 0.01 |
| 4 | Iron dosing | 0.012 |
| 5 | Iron dosing | 0.015 |
| 6 | Aerate influent | 0.02 |
| 7 | Peroxide dosing | 0.5 |

**Further efficiency assessment and economical analysis of management options:**

Promising management options will be further assessed by means of mathematical modelling and then a cost-benefit analysis will be performed for the proposed management protocol



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