

# Essex & Suffolk Water, Hanningfield

## Sludge treatment reed bed: Waterworks sludge



### Project

Essex and Suffolk Water, Essex

### Location

Hanningfield, Essex

### Project type

Drinking water sludge treatment – trial

### Wastewater type

Ferric sludge

### Completion date

August 2010

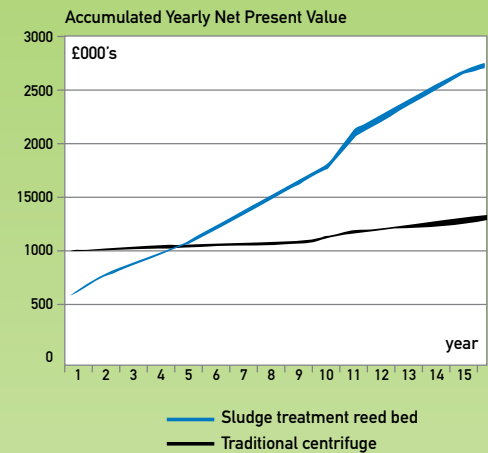
### Treatment

Sludge treatment reed bed

### Need

The asset management strategy for Essex and Suffolk Water identified a need for a new process for sludge handling at Hanningfield Water Treatment Works (WTW). Supplied with raw water from Hanningfield Reservoir (354 Ha), Hanningfield WTW produces 150 million litres of potable water a day. As part of the water treatment process, 2-4 million litres of ferric (Iron) sludge per day is generated primarily from the de-sludging of the Pulsator clarifiers. The sludge is primarily a mineral sludge with seasonally fluctuating levels of algae and suspended solids.

### Comparison for 50,000 Population



This cost comparison graph has been produced to demonstrate the potential cost and CO<sub>2</sub> emission reduction achievable by introducing sludge treatment in reed beds as opposed to traditional disposal routes. The comparison is based on a sludge production of 1,000 tonnes of dry solids, equivalent to a population of 50,000.

Historically these sludge wastes have been pumped to the sludge lagoons at Hanningfield Reservoir. However, these are now nearing the end of their serviceable life and a new sludge handling process is required. The two options being

considered are a mechanical centrifugal solution and sludge treatment reed beds. A trial system was required to determine if ferric sludges are suitable for further treatment in Sludge Treatment Reed Beds. The proposed use of reed bed systems reduces the capital and operating cost and provides the site with an environmentally friendly operation area.



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### Trial

ARM in partnership with Orbicon conducted the trial during 2008 and 2009. In order to make a reasonable estimate of the efficiency of Sludge Reed Beds under these particular circumstances, the Hanningfield test system was built with six basins each of 20 m<sup>2</sup> with a design comparable to a full-scale plant and planted with *Phragmites australis*.

The purpose of the test was to clarify:

- Whether the sludge from Hanningfield Water Treatment Works is suitable for further treatment in a sludge reed bed system.
- The dimensions required (capacity, operations, loads, area, number of basins, etc.) for a full scale plant at Hanningfield Water Treatment Works.
- The quality of reject water from a sludge reed bed system treating sludge from Hanningfield Water Treatment Works.

The sludge was loaded onto the surface of the trial reed beds. As the sludge dewateres, the sludge residue remains on the surface whilst the water permeates through the filter media. The surface sludge cracks up in the dewatering process.

### Results

The test confirmed that sludge treatment in reed bed system has many advantages compared with the mechanical treatment option.

- The reeds colonized the whole area without requiring additional fertilizer.
- Samples of the reject water show that the media filter has a good filtration capability.
- The sludge residue on the surface cracks well – a good indication of dewatering.
- The sludge volume is reduced to approximately 1/200 of its original volume.
- The dry solid content of the dewatered sludge residue is approximately 30 – 40% during operations and 50 – 60% dry solid content after the final resting period prior to emptying.
- A full scale system with a process area of 42,500 m<sup>2</sup> over 16 basins was ordered.
- A new trial investigating alum sludge is taking place.

