

# Natural Energy Efficiency and Sustainability (NEES)

## Draft Template for Pilot Projects

### 1. Description of the Project

This project is for an upgrade to the old sewage treatment system serving the lighthouse keepers house at Valentia Lighthouse in Co. Kerry. The lighthouse keeper's house was originally used for the keeper and family, but since automation of the light in 1947, a part time attendant was appointed and the house has been empty. This project was carried out to accompany the renovation of the building as a visitor centre in order to ensure that the sewage is treated in a sustainable manner before percolation.

An existing septic tank and glass cullet reed bed were in place on the site, but the reed bed hadn't yet been connected or put into use. FH Wetland Systems was commissioned to assess the capacity of the existing system and it was determined that a significantly larger area was needed in order to properly address the greater anticipated loading from the new visitor centre.

The new treatment system comprises the existing septic tank, a new vertical flow gravel reed bed system, a new horizontal flow gravel reed bed system and a new distribution area for the final tertiary polished effluent. In tandem with this treatment process, a urine diversion toilet has been installed that will remove urine at source for recycling to agriculture. The environmental benefits of urine diversion include a reduction in pollution potential on-site and a reduction in the need for purchased artificial fertiliser on the farm where it will be used. The removal of urine also helps to keep the overall reed bed sizes lower, which was important in this small site area.

The system was designed by FH Wetland Systems and installed by South Kerry Development Partnership. The system has been fully planted with selected native Irish wetland plant species by both FHWS and SKDP

### 2. Contribution to Resource Efficiency

Most conventional sewage treatment systems use pumps and blowers to oxygenate the effluent in order to remove the main contaminants. Reed beds and constructed wetland systems can achieve the same degree of treatment without that constant energy requirement. In this case a pumped feed is needed initially because of the topography of the site, but the overall energy usage is significantly lower than would be the case for a standard mechanical treatment system.

### 3. Environment and Health

Flush toilets, for all their convenience, have the undesirable drawbacks in that they waste a considerable amount of fresh water, biomass and nutrients. In this instance, it was decided to keep with the flush toilet for the benefits of familiarity and ease of maintenance that they offer, but to use a urine diversion toilet so that at least this high-nitrate element of the waste stream could be routed to agricultural reuse rather than simply adding to the size requirements of the reed beds.

### 4. Sustainability

On a wider scale, the use of urine diversion will provide an excellent public example of source separation technology and will help others to embrace these methods of sustainable nutrient cycling.

- The urine diversion toilet used at Valentia was imported from Sweden. Even though this contributed to the overall carbon footprint of the project to some



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extent, the environmental benefits of recouped local nutrients far outweigh the initial carbon inputs.

### 5. Enterprise aspects

Constructed wetlands and reed beds offer a way for small rural enterprises to deal with sewage in a very thorough and cost-effective manner. By demonstrating the use of reed beds in a high-profile location such as the Valentia Lighthouse, it will assist others in adopting similar methods and help to facilitate planning procurement for SMEs in rural Kerry.

### 6. Scalability

Although the lighthouse site is unique, with unique topography, geology, scale and location, the technologies adopted here for sewage treatment are easily transferred to other developments throughout Ireland and Europe. The Irish EPA Code of Practice on Wastewater Treatment and Disposal Systems Serving Single Houses includes constructed wetlands and reed beds as a treatment option and similar guidelines exist in other EU countries.

Source separation is most advanced as a technology and focus of academic study in Scandinavia, and there are plenty opportunities for an emerging green economy to examine locally appropriate solutions throughout Europe.

### 7. Conclusions

The most interesting aspect of this project was the dedication to the use of environmentally sustainable solutions for sewage treatment. Source separation of sewage inputs such as faecal biomass and urine are at the forefront of sanitation research and development in Europe as we look towards a future with genuine joined up thinking. There is great potential for broad-scale use of this resource in agriculture instead of limited artificial fertiliser sources.

The vertical and horizontal flow gravel reed beds following the septic tank are another eco-friendly technology to provide further treatment to the septic tank effluent before percolation.

The inclusion of this project at the Lighthouse site will enhance the overall visitor experience and will also tie in an environmental education element to the overall visit.

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