

## **Operational Integrated Constructed Wetlands (ICW) for which Local (Government) Authority approval has been obtained, 1996-2008.**

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**These 3 pages list 'Integrated Constructed Wetlands'** that have received Local (Government) Authority approval. The list contains ICW systems treating 60-point sources and one-diffuse source of pollution.

The 'Integrated Constructed Wetland Initiative' strives to provide seven key **interconnected** environmental services:

- Water quality management; addressing all aspects of contamination (microbial, chemical and sedimentary)
- Water quantity management (flood-control and reuse of freshwater)
- Nutrient reuse (special focus on phosphorus capture and retention)
- Carbon management (including reuse and sequestration)
- Restoration of lost or diminished biodiversity
- Amenities and social well-being
- Cost effectiveness in capital development and operation (including food and structural-goods products)

The performances of the listed systems are known to perform within their intended capacity. In only three cases have design criteria been notably exceeded. Most of the listed ICW systems have been monitored. On-going systematic and intensive monitoring occurs in the Annestown-Dunhill catchment, at Glaslough, on industrial sites and where public water supply extraction occurs. In some cases the monitoring data exists for 11 years. There are no chemical or biological data indicating evidence of significant untoward impacts on either ground or surface water resources. Performance data for the Annestown-Dunhill catchment ICW systems and design criteria have been published in peer-reviewed scientific journals. In addition, biological monitoring indicates sustained environmental quality and levels of invertebrate biodiversity that match those found in nearby natural wetlands. Vertebrate populations including that of amphibians and native fish have responded well to the 'ICW Initiative'.

Recent rainfall events have provided additional insight into the integrity of the ICW concept with no known failures or reduced capacities in performance. The ICW systems addressing diffuse rural pollution, including the re-profiling of the Annestown-Dunhill stream have retained their integrity during the recent weather challenge, further enhancing and widening the scope inherent within the ICW concept.

### **Annestown stream valley, Co, Waterford (Focused study area)**

- 13 farmyards (yard runoff, silage effluent, yard and dairy parlour washings, including 2 cattle wood-chip holding yards) 1996-2005
- Dunhill village sewage (septic tank effluent) P.E. 100. 1999.

- Dunhill Enterprise Centre (septic tank and industrial kitchen effluents) 2007/8
- Dwelling house (septic tank effluent) 2005

#### **State Visitor Centres, DoEHLG/OPW**

- Wexford North Slob Nature Reserve (septic tank effluent) 2001
- War-house, Heritage Site, Co Tipperary (septic tank effluent) 2001
- Tintern Abbey, Co Wexford (septic tank effluent) 2007/8
- Garnish Island Gardens, Glengariff, Co Cork (tertiary treatment from a 'Puraflow' system) 2007

#### **Villages with populations above 500 (Intensive ICW study)**

- Glaslough/Castle Leslie, Co. Monaghan (Raw sewage) P.E. 2000. 2007/8

#### **Urban surface water/streams**

- Tolka Valley Park, Dublin City (culverted stream contaminated by misconnections and road runoff) 2001-2002. An additional 3 ICW systems are planned for the city and its environs. Amenity and the management of hydraulic fluxes are significant elements for these systems.
- Adamstown Link Road, S. County Dublin (road runoff) 2006/7

#### **Industrial**

- Glanbia's Kilmeadan, Cheese factory, Co Waterford (raw dairy effluent c. 1300m<sup>3</sup>/day). *N.B.* Cheese production has ceased but there is intermittent use for contaminated yard water. 1997-2005.
- Ballon Meats, Co Carlow (DAFF effluent, factory yard runoff and cattle wood-chip holding yard) 2001-2006
- 2 ICW systems at Kilbeggan Meats, Co Westmeath and Newgrange Meats, Co Meath (wash water). Operational status unknown due to limits on organic and hydraulic loadings. 2004
- Tipperary Cheese, Littleton, Co. Tipperary. (raw dairy effluent) 2007
- Dawn Meats, Carrolls Cross, Co Waterford (washwater) 2003
- Rose County Foods, Gisburn, Lancashire, UK. (washwater) 2005

#### **Small Conurbations/Villages/Residential Institutions/Hotels**

- Kill village, Co. Waterford (septic tank effluent) P.E 500. 2008
- Stradballymore housing development, Co. Waterford. (septic tank effluent) P.E 250. 2005
- Ballygowden Development, Clough, Co. Laois. (septic tank effluent) P.E 250. 2006.
- Seanachai Development, Dungarvan, Co. Waterford. (septic tank effluent) P.E 88. 2007.
- Ballyseede Castle Hotel, Tralee, Co. Kerry. (septic tank effluent) P.E 130. 2007.
- Stable Yard Development, Glaslough, Co. Monaghan. (septic tank effluent) P.E 70. 2007.
- Enda Henessey, Roscrea, Co. Tipperary. Restaurant. (septic tank effluent) P.E. 30. 2001

- Rathfredagh Cheshire Home, Newcastle West, Co. Limerick(septic tank effluent) P.E 80. 2005
- Shean Hospital, HSE Institution, Co Laois. (septic tank effluent) (septic tank effluent) P.E. 50. 2004

### **Single Houses**

- 2 in Co. Wexford (septic tank effluent) 2003-2004

### **Other Farmyards**

(mixture of yard generated runoff, silage effluent and yard and dairy parlour washings)

- 3 in Co. Meath (one also treating dairy processing waste water) 2004-2007.
- 2 in Co. Tipperary. Beef. 2002
- 11 in Co. Limerick. (includes one with runoff from cattle wood-chip holding yard and one that is up gradient of a public water supply) 1998-2003
- ADAS, Pllpeiran, Wales, UK. (EU-INTERREG funded and includes research facilities) 2007

### **Recreational**

Marfield Golf Course Development, Clonmel, Co. Tipperary. 2007

### **Specialist ICW systems**

- Dungarvan Landfill, Co Waterford. (leachate pumped from landfill). Expected to be operational in the immediate future and will be subject of focused study. 2008
- Mathewstown Piggery, Co Waterford (surface water) 2001

### **Rural Diffuse Pollution Management**

About 5 km and 0.5 km of the upper and mid sections of the Annewstown-Dunhill stream, Co, Waterford have been re-profiled to enhance its environmental (water quality and flood abatement), biological and amenity capacities. The design principles of the ICW concept have been applied. Sources of diffuse pollution from adjacent ground water and lands up-gradient to the stream have been intercepted by parallel embankments and associated perched wetlands. Other associated work includes joined-up engagement with local forest and woodland management, further expanding the capacity for integration and sustainable natural resource management.

### **References**

Scholz M., Harrington R., Carroll P. and Mustafa A. (2007), The Integrated Constructed Wetlands (ICW) Concept, *Wetlands*, 27 (2), 337-354.

Zhang L., Scholz M., Mustafa A. and Harrington R. (2008), Assessment of the Nutrient Removal Performance in Integrated Constructed Wetlands with the Self-organizing Map. *Water Research*, 42 (13), 3519-3527.