(Agricultural Need for Sustainable Willow effluent Recycling):

An EU funded project to encourage the use of SRC willow for bioremediation.

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AFBI Environment and Renewable Energy Centre, Hillsborough

Agenda

- Challenges and brief background
- Principle
- SRC Willow production systems
- Irrigation System Construction
- Irrigation System Control
- The ANSWER Project aims
- Six constructed schemes and early data
- Nutrient Management
- Regulation
- Policy change ?!

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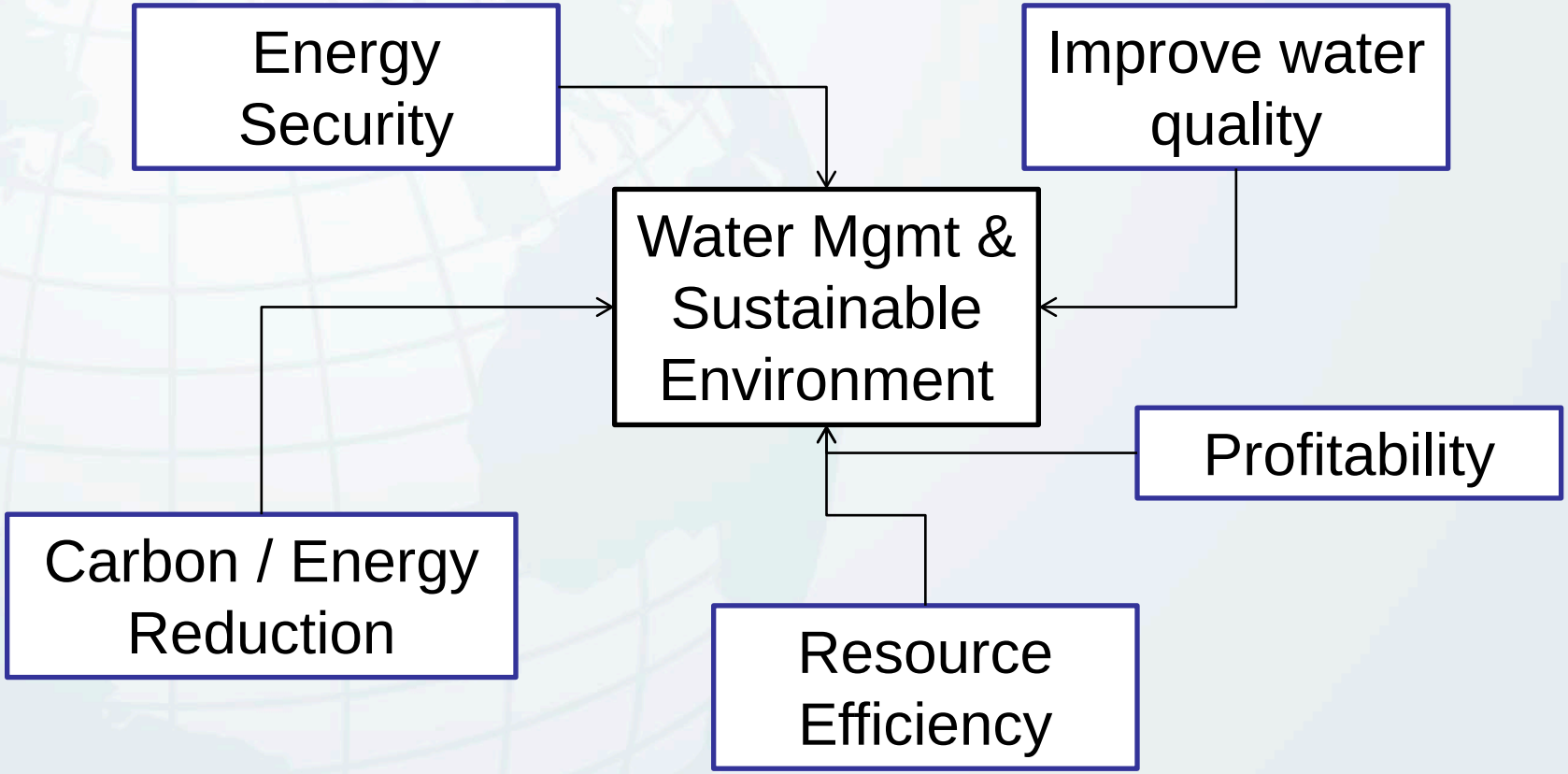
The challenges - *Contradictory !!?*



Are there Holistic Solutions to Delivers Multiple Wins!!!

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Background

- To Date, Water Quality Legislative Compliance has Accelerated Energy Consumption & Green House Gas Emissions.
  - Population increases
  - Equipment Upgrades
  - Capital spend
- NIWater is NI's largest Electricity Consumer & GHG Emitter!!
- What options exist for meeting these challenges

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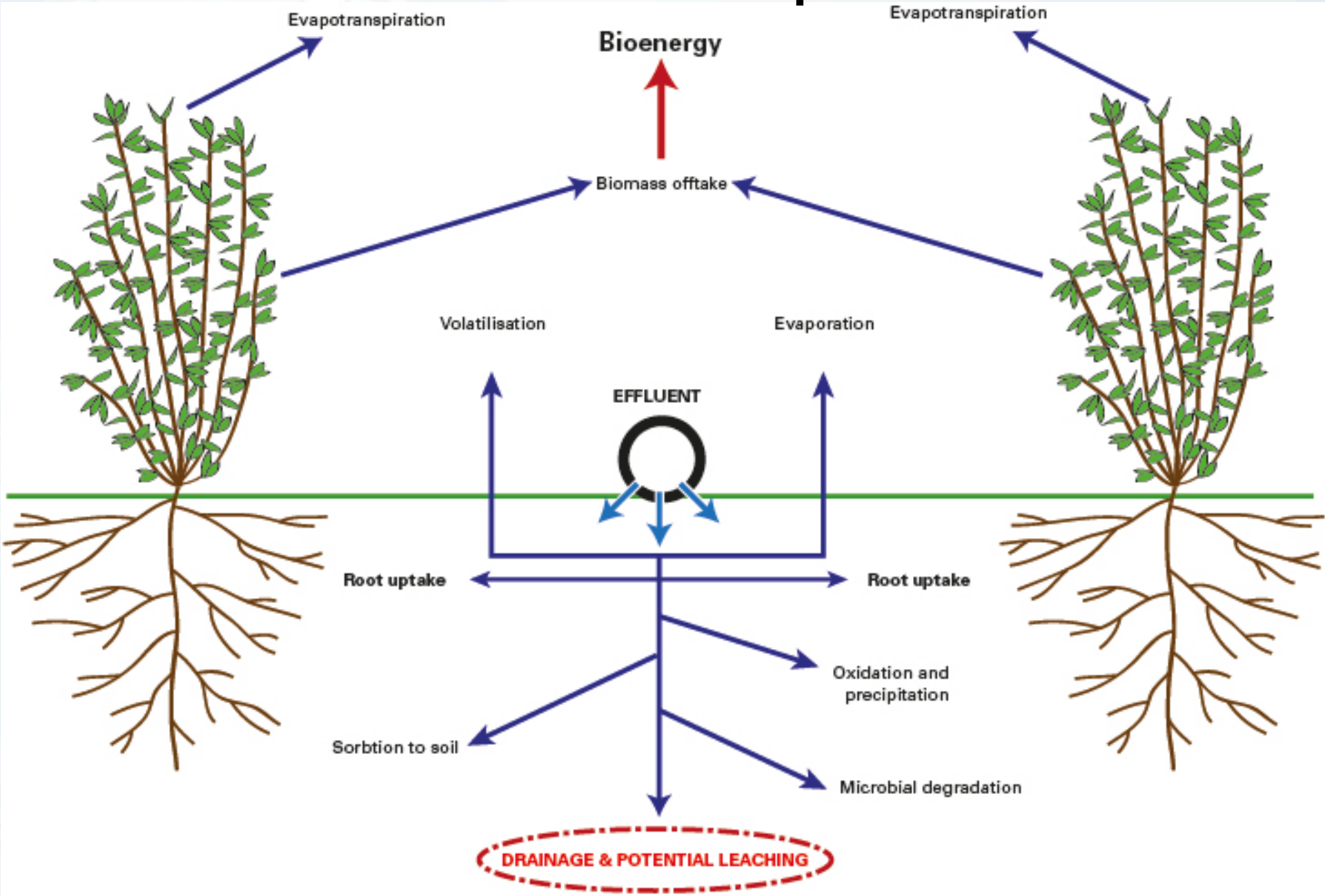
The Principle



SRC Willow Production



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Irrigation System Construction






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Irrigation System Control

DoE Water (Northern Ireland) Order 1999 Consent to Discharge Effluent' compliance with...

The stream water and groundwater monitoring points (bore holes) are tested for BOD, ss, Total N, Total Ps, pH and DO. Daily recording of Soil Moisture, Volume of Effluent supplied (by Zone)

Climate controlled irrigation.

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ANSWER Project Aims

- To provide scientific evidence on the effectiveness and sustainability of using SRC willow, for the management of waste water effluents.
- To establish FIVE effluent recycling schemes:
  - Bridgend, 14 ha (Donegal Co Co)
  - Clontibret, 7 ha (Monaghan Co Co)
  - Knockatalon, 5 ha (Monaghan Co Co)
  - Dromore, 15 ha (NIWater)
  - Ballinacarrick Landfill, (Donegal Co Co)
  - Churchtown Landfill, 4 ha (Donegal Co Co)
- Investigate GIS mapping, clonal fitness for effluents and leachates, pathogen survival, biodiversity and overland flow.

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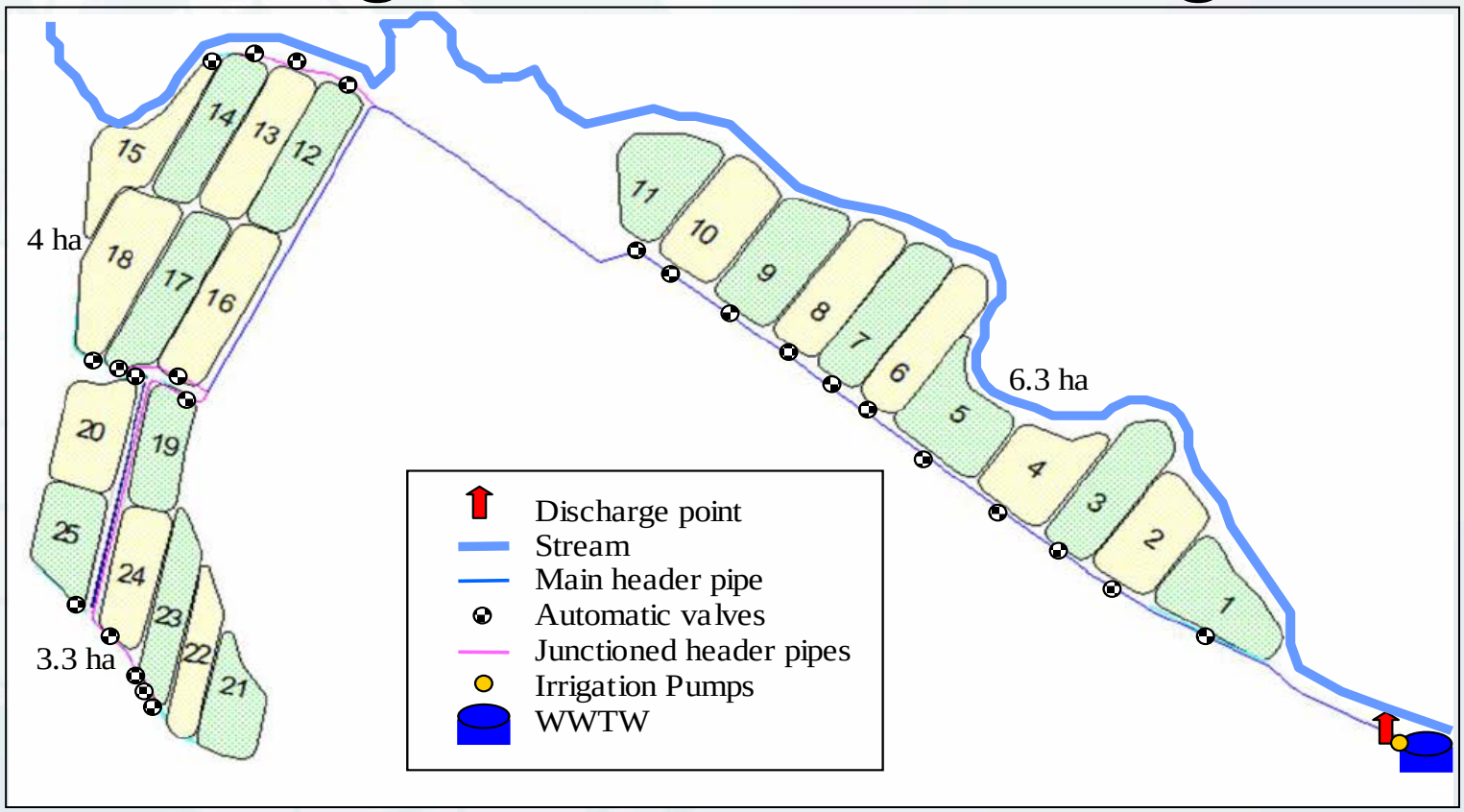
Bridgend – Co Donegal



- Treatment: - Aeration, settlement, small sump regularly pumped to the main 400 m^3 storage tank.
- In-Flow 80 m3/ha/day
- Irrigation from the 400 m^3 storage tank

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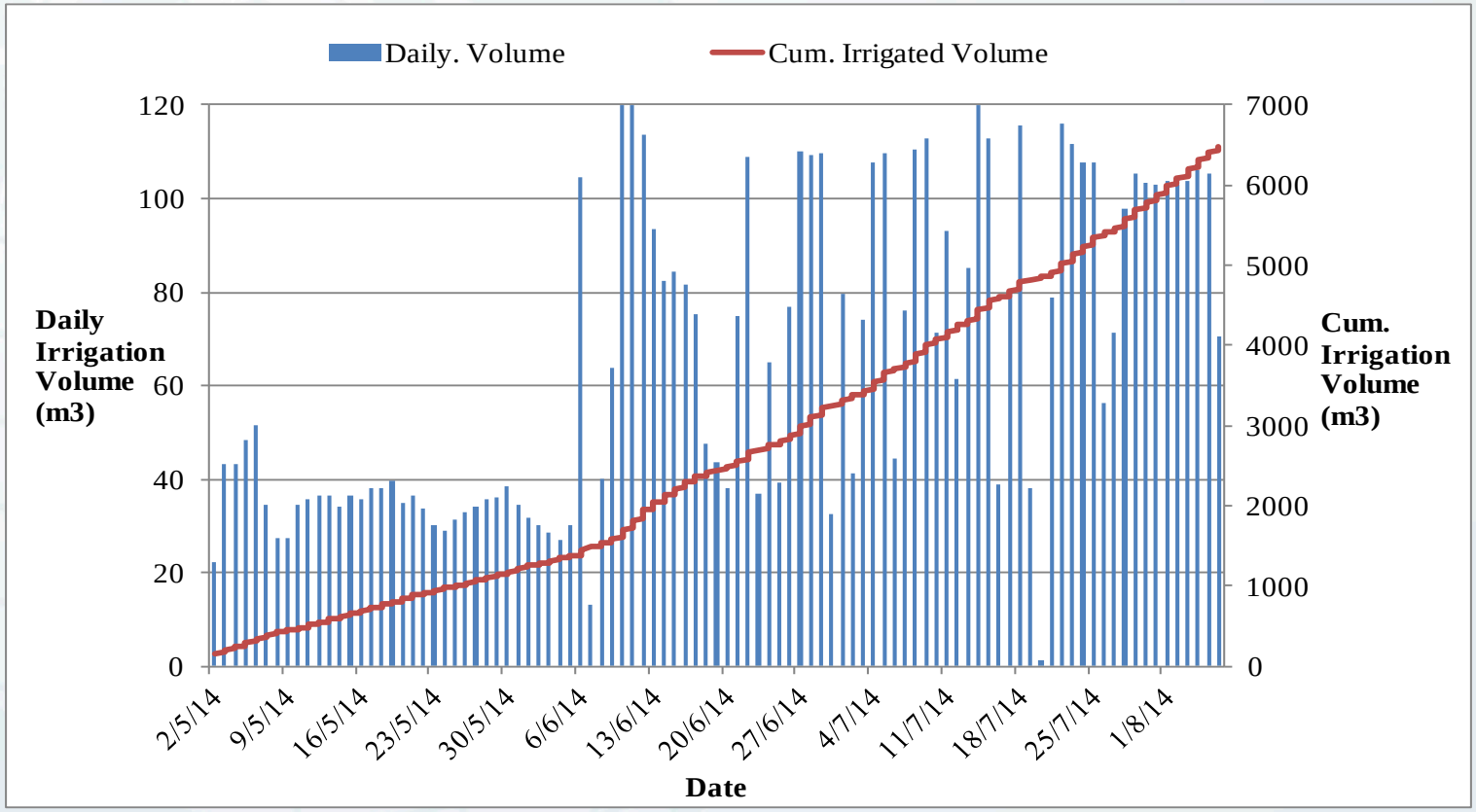
Bridgend – Co Donegal



Commissioned May 2014

5,129m^3 irrigated to 5th August

5,816m^3 inflow during period.

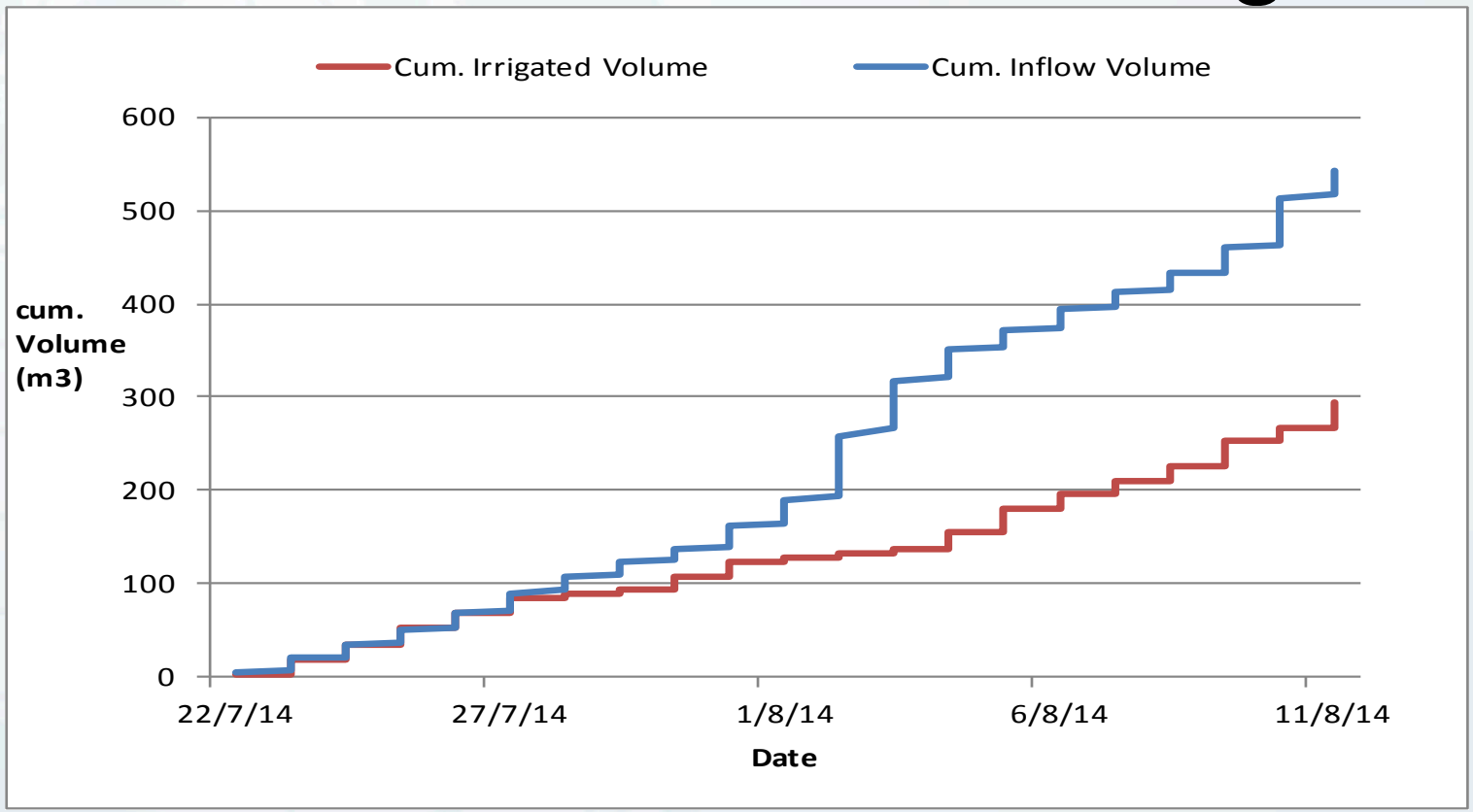
12% has been discharged.

88% has been recycled.

84m^3 day^{-1} (avg irrigation volume)

6m^3 ha^{-1} day^{-1} (avg hydraulic loading)

Knockatallon – Co Monaghan



Commissioned July 2014
294m^3 irrigated to 11th August
543m^3 inflow to 11th August.
44% has been discharged.

54% has been recycled.
15m^3/day (avg irrigation volume)
3m^3 /ha/day (avg hydraulic loading)

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Dromore – Tyrone

Construction August / September 2014
Into an Established Plantation
Commissioning September 2014
Phase 1 - To take approx 20% of secondary treated effluent
Phase 2 – To irrigate approx 20% of primary treated effluent

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Landfill Leachate



Ballynacarrick Landfill site
12 Lysimeters irrigated under 4 irrigation regimes


Churchtown Landfill site
Cap engineered and planted with 3 ha SRC Willow. Irrigation commencing Spring 2015

EPA required the council to take action.

Uniquely constructed and within the site footprint.

In conjunction with an ICW.

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Nutrient Loading

WWTW Site		Estimated PE managed (pop. equivalents)	Willow irrigated (ha)	Hydraulic Loading (m/ha)	Suspended Solids (kg/ha/y)	Nitrogen (kg/ha/y)	Phosphorus (kg/ha/y)
Bridgend	Total Loading	500		31025	1551	980	46
	per ha loading		14	2216	111	70	3

The different irrigation schemes represent the following

Prevention of discharge at treatment works of …
180 kg to 980 kg Nitrogen per year and
23 kg to 58 kg Phosphorus per year

The subsequent energy crop nutrient loading is …
24 to 70 kg Nitrogen/ha/year and
3 to 8 kg Phosphorus/ha/year
With Hydraulic loading rates ranging from 1300 to 2200 m^3/ha/year

Ref. Fertiliser Manual (RB209) 8th edition and independent AFBI data

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Regulation

‘DoE Water (Northern Ireland) Order 1999 Consent to Discharge of Effluent’ – requirements dictate.

- Compliance with ‘Quality Conditions of any Waterway’,
- Compliance with the ‘Conditions of Discharge’,
- Compliance with ‘Conditions for Application’
- Compliance with ‘General Conditions’ and a ‘Self Monitoring Regime’.

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Water Policy

Department of Regional Development

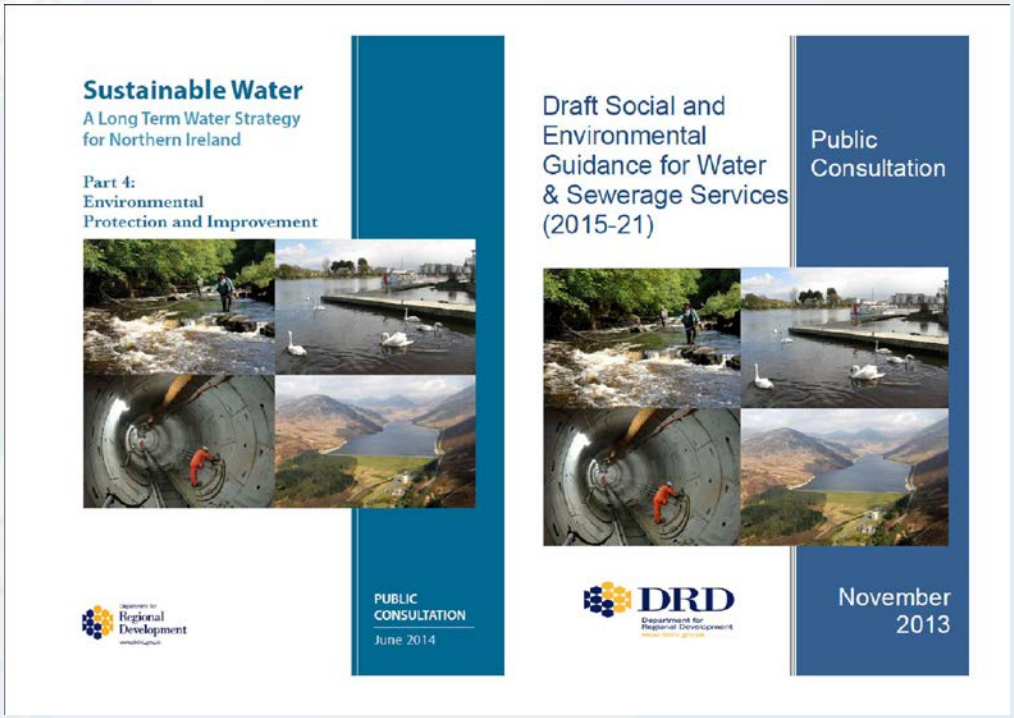
Should "NI Water gradually transform its wastewater assets through sustainable treatment technologies to help manage future operating costs?"

New sustainable solutions will contain risk and a call for support and encouragement from...

- Policy makers
- Environmental regulators
- Economic regulators
- Utility customers

An Environmental Champion

SRC Willow plantations
Integrated Constructed Wetlands



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