



NORFOLK  
RIVERS TRUST

# Integrated Constructed Wetlands

David Diggins

CEO

Norfolk Rivers Trust

# This year, we're focusing on **planning** issues in regards to **wetlands**

- ❖ To provide an overview of the latest national and **county-level initiatives** in **planning** and **best practice** related to spatial planning, development management **and biodiversity**
- ❖ To encourage an exchange of experience about **biodiversity issues in planning** amongst planners, consultees and ecological consultants in Norfolk, Suffolk, Essex and neighbouring counties

***Clean Water – Biodiversity – Carbon- Community***

# NRT's Mission Statement

Norfolk Rivers Trust's mission is to enhance the value of the aquatic landscape through encouraging natural processes, with benefits for wildlife and people.



**NORFOLK RIVERS TRUST**

**Our VISION**  
Our vision is to ensure that the quality of water provides the best habitat to benefit people and wildlife by delivering:

- Aquatic habitat creation;
- Conservation and restoration;
- Education and engagement; and
- Land management and farm advice.

**Our APPROACH**

**As an independent and trusted charity** our team of experienced ecologists and advisors take a river Catchment Based Approach (CABA) to develop practical, cost-effective and integrated long-term solutions.

Working across Norfolk, and extending out into the Cam and Ouse Catchment (CamOuse), the scale of the challenge necessitates partnering working with a wide range of organisations. These include farmers and landowners, water companies, government bodies and other charities, as well as the general public.

Our funders include government bodies (local and national), private corporations, charities and independent donors.

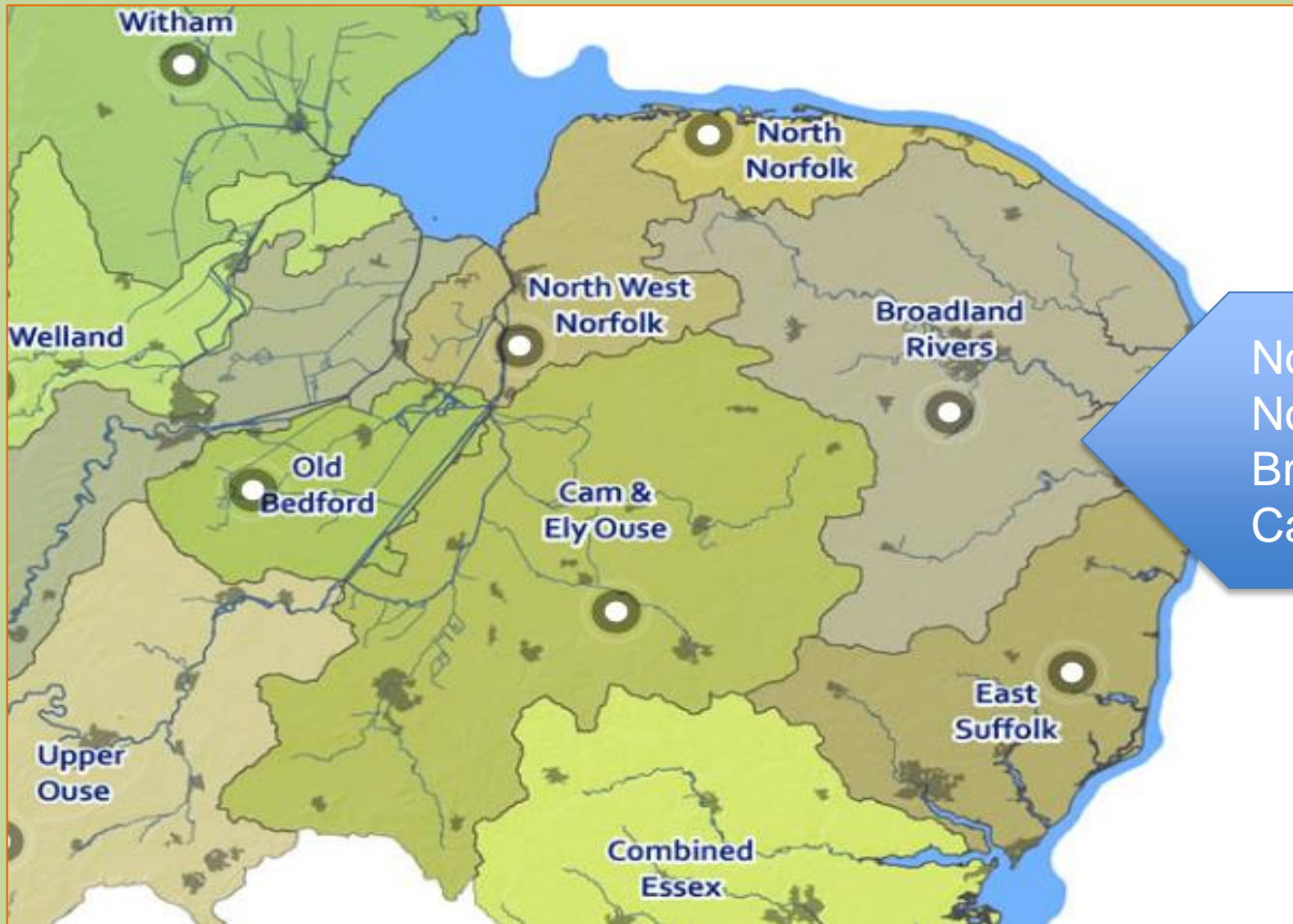
# Background

- Formed in 2011
- Trusted, independent and local
- Delivering change on the ground
- HQ - T/O £1m annual – 10 FT staff
- Farming advice – 5 Staff funded by WWF and Coca-Cola Freshwater Initiative
- Restoration and wetlands
- Education
- Trading arm – Norfolk Rivers Ecology
  - Deliver the big projects

# Charity Funding

- ❖ Environment Agency
- ❖ *Natural England*
- ❖ World Wildlife Fund
- ❖ *Tesco, Asda, J Sainsbury, Courtauld 2025*
- ❖ Utility companies
- ❖ *Lottery*
- ❖ Private Trusts and donations
- ❖ *Europe*

# Working on a catchment-scale across the region



North Norfolk  
North West Norfolk  
Broadland  
Cam and Ely Ouse

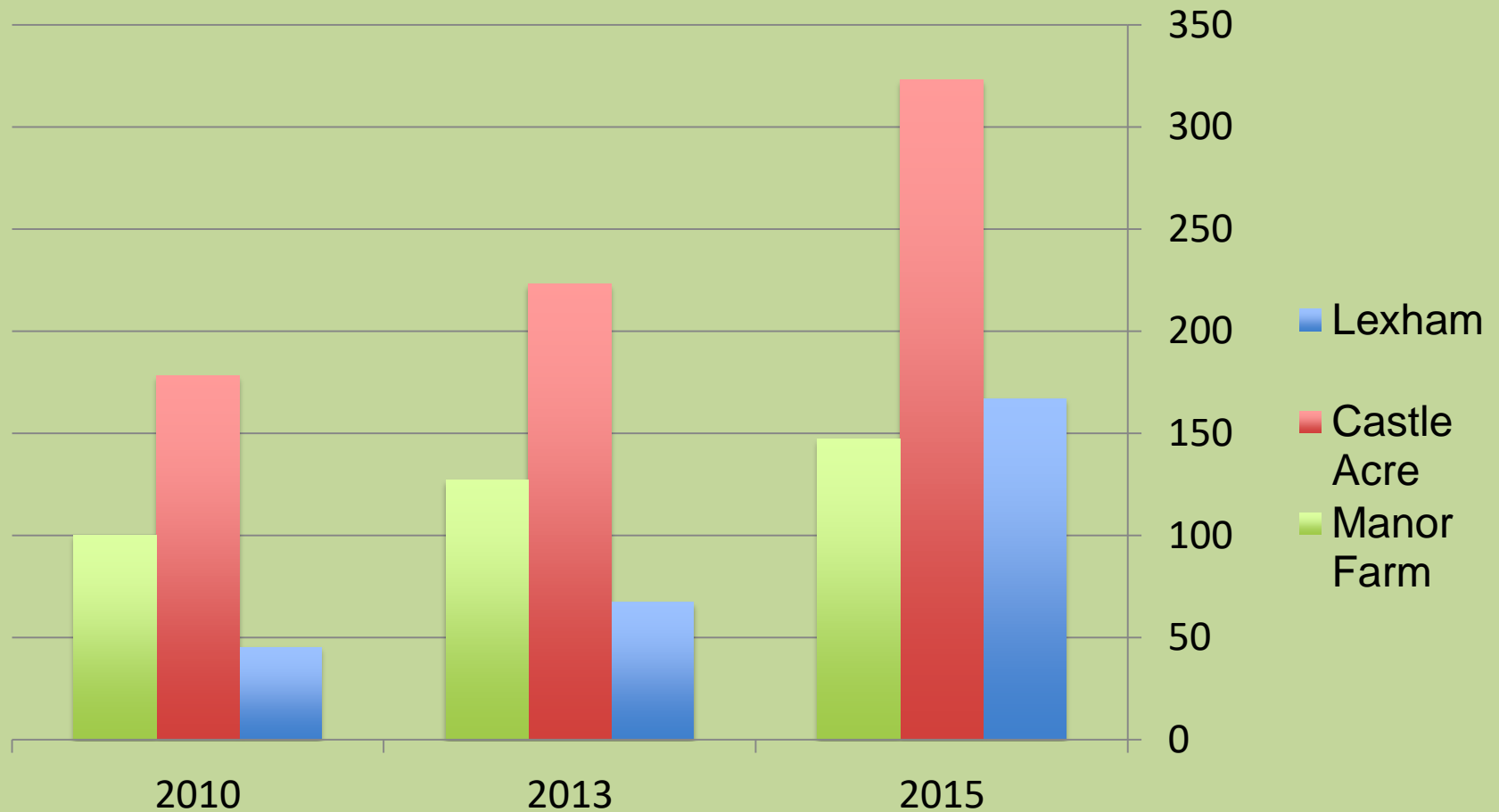
# Restoration



# Examples of silt trap interventions



# Fish density impact - River Nar silt traps/and woody debris



Fish numbers on Nar: EA Electro-fishing data 2015

## What has Water Sensitive Farming achieved so far?

From 2012 to date (Spring 2019):

Over **140** farmers have received one-to-one farm advice (as well as follow-up visits)



Over **2,250** ha of land use improvements delivered



**73** silt-trap type interventions constructed



**230** ha of tramline disruption trialled on arable land



Promoted to over **4,000** farmers and agronomists at events



Over **1.4 billion** litres of water returned (replenished) to the environment; at least 470 Olympic-sized swimming pools!



Broadland  
Catchment  
Partnership



# This year, we're focusing on planning issues in **Wetlands**

## **Integrated Constructed Wetland**

*To provide an overview of the latest national and county-level initiatives in planning and best practice related to spatial planning, development management and biodiversity.*

To encourage an exchange of experience about biodiversity issues in planning amongst planners, consultees and ecological consultants in Suffolk, Norfolk, Essex and neighbouring counties.

**So Let's See what we can do to make Change with Wetlands  
By Joining up the Dots**

## **Integrated Constructed Wetlands (ICWs) are:**

Constructed systems that use natural functions such as vegetation, soil and organisms to treat wastewater

# Two Wetlands: One Outcome Water Quality in Norfolk's Chalk Rivers Improved

- 1) River Mun, Northrepps Wetland (Pilot Scheme) 2014
  - Private agreement with landowner
  - Catering for 800 inhabitants
  - Phosphate focus
  - Proved the science which led to Anglian Water Ingol project
  
- 2) River Ingol AWG Sponsored May 2018
  - Larger ambitions - 6000 inhabitants
  - Ammonia focus
  - Great opportunity to compare and contrast
  - Research – microplastics and other water-vectored substances
  - SIP 3 Special Investigations
  - Potential for **NATIONAL IMPACT**

NORTHREPPS

- 0.4 ha site
- Site size is dictated by population size
- Population at Mun STW 850 (population equivalent) i.e. 850 bottoms
- Targeting phosphate (P)




- Money From Catchment Restoration Fund (CRF)
- Private landowner – Wished to share in the Pilot
- No landowner payment
- Taking treated sewerage – piped to site

# Northrepps Wetland River Mun

- Fantastic community buy-in with 60+ local volunteers involved in creation
- Increases Biodiversity
- Creates opportunity for Net Gain
- On-site wildlife watching hide set up for locals
- Sightings include kingfishers, barn owl, otters, water vole.



The Clocktower 



The River Ingol before the creation of  
the ICW

# The Ingol Project

Small Chalk River  
STW 50% River Flow

- ❖ Collaboration
- ❖ Teamwork
- ❖ Natural Solutions



# Ingol footprint



- Population 6000 PE
  - 6000 people, 2000 washing machines
- Total area of land required 2.2ha
  - Wetland area 1.3ha
  - Calculated on flow concentration of pollutants



# INGOL CONSTRUCTION PHOTOS



# INGOL Community Benefits

- Local Primary School
- Local No Objections
- Planting Volunteers
- Positive Local Impression
- Opportunities
  - Bird watching
  - Community-based monitoring
  - Fishing
  - Additional cells
  - Long-term
  - Natural



# INGOL

## Rapid ecological changes

Rapid change in insects, birds and bats.

Dragon and damsel flies

Honey and Bumble bees

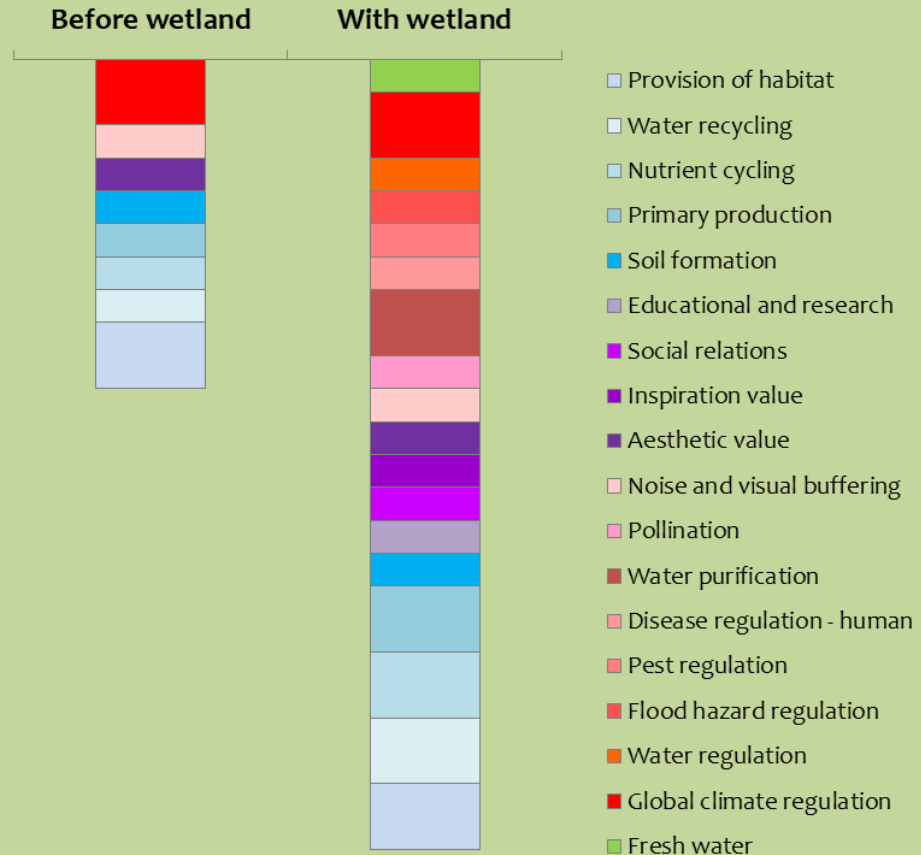
Red Shank to Red Kite

**All known Norfolk bats**

**WATER VOLES arrived**

All recorded in under a year

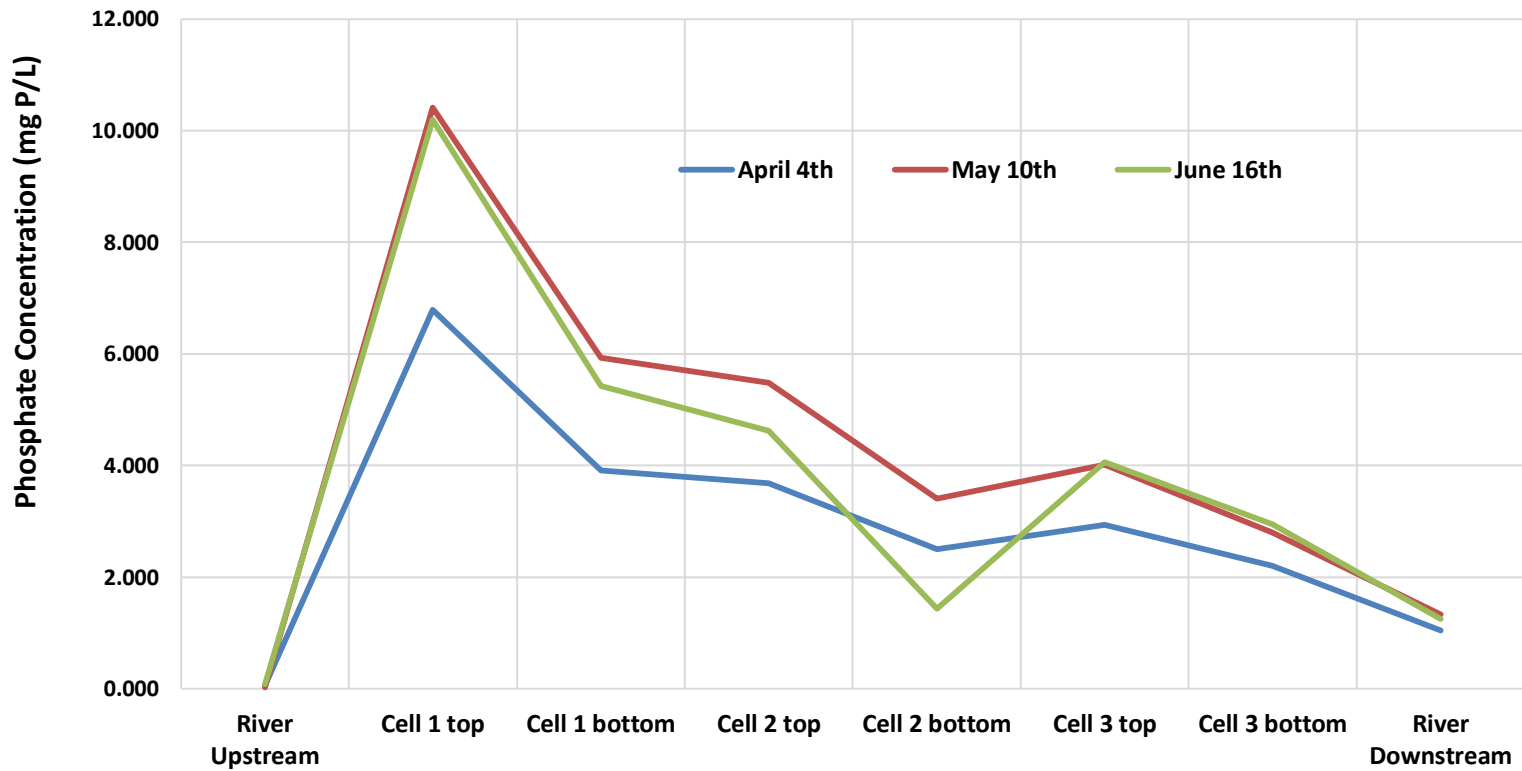
# Ecosystem services assessment of the Ingol ICW



ICWs provide the opportunity to create enhanced stocks of natural capital and to increase the flows of ecosystem services from those stocks

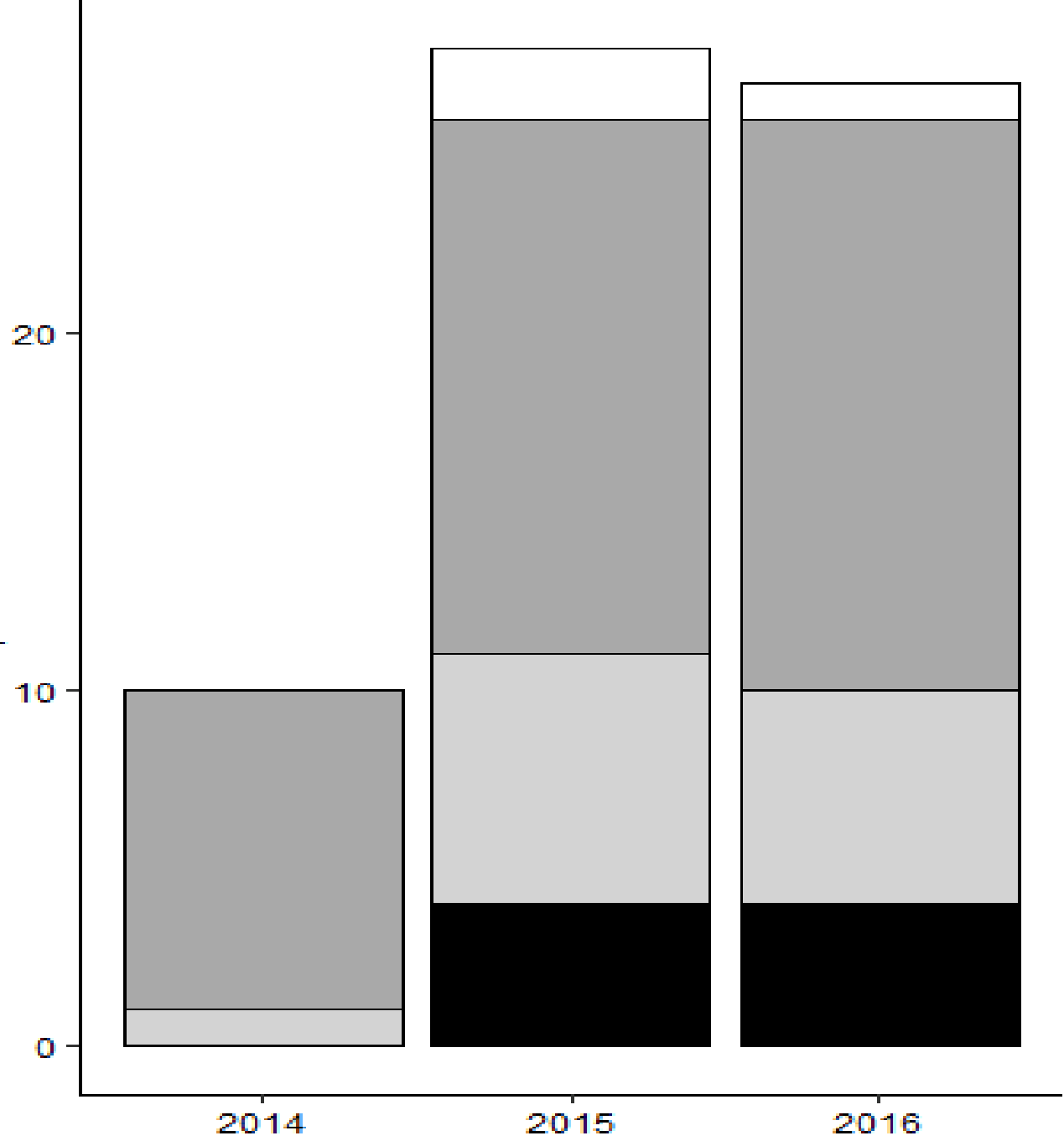
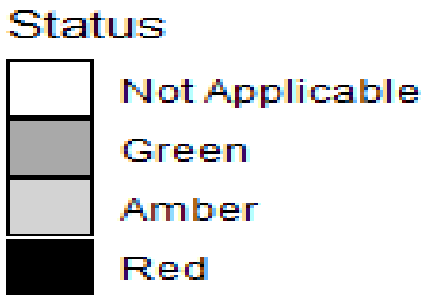
# Northrepps Performance

## Frogshall Wetland - Phosphate



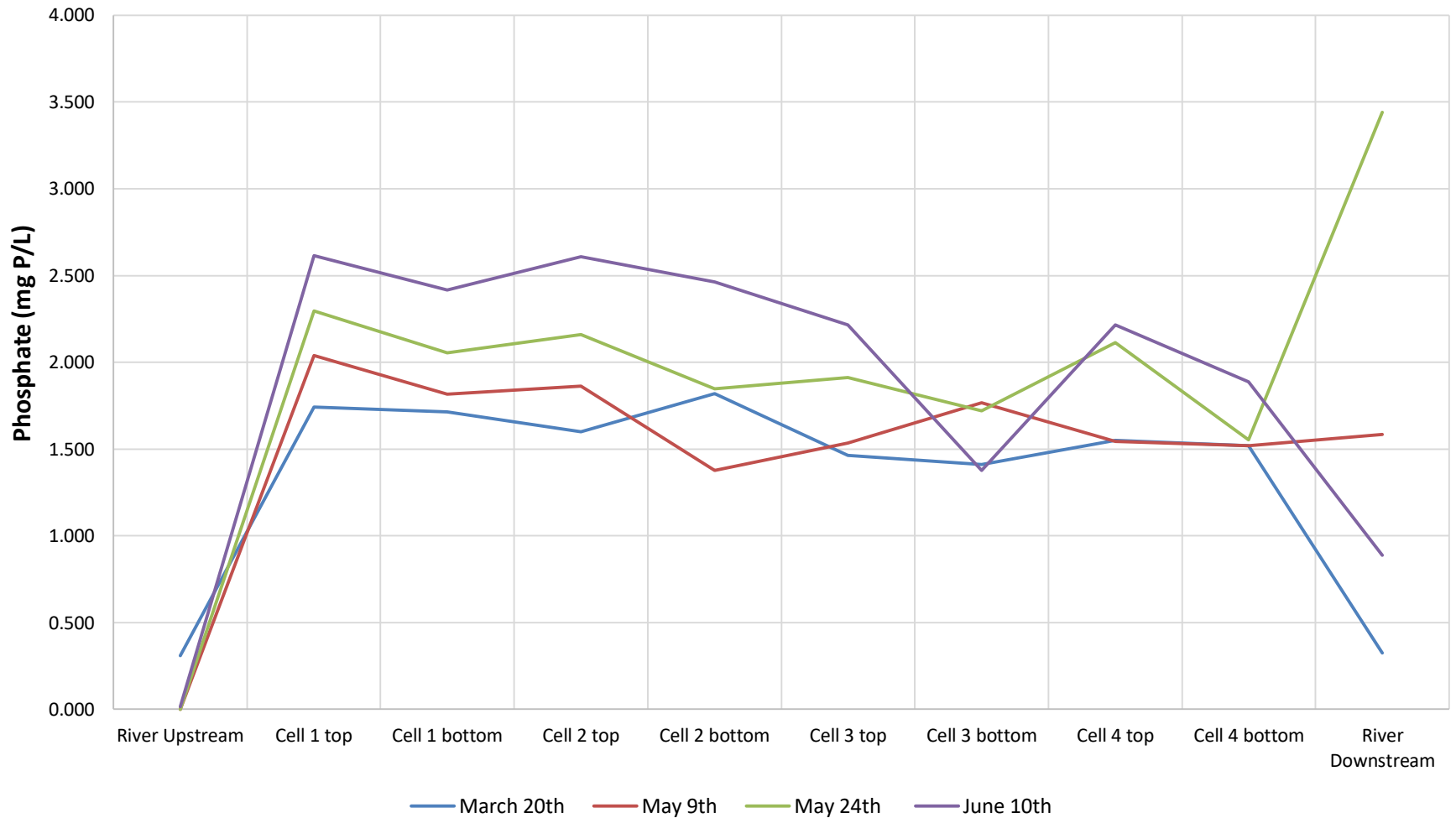
**BIRD SPECIES @  
NORTHREPPS**

Species richness



# Ingol Performance

## Ingoldisthorpe Wetland - Phosphate



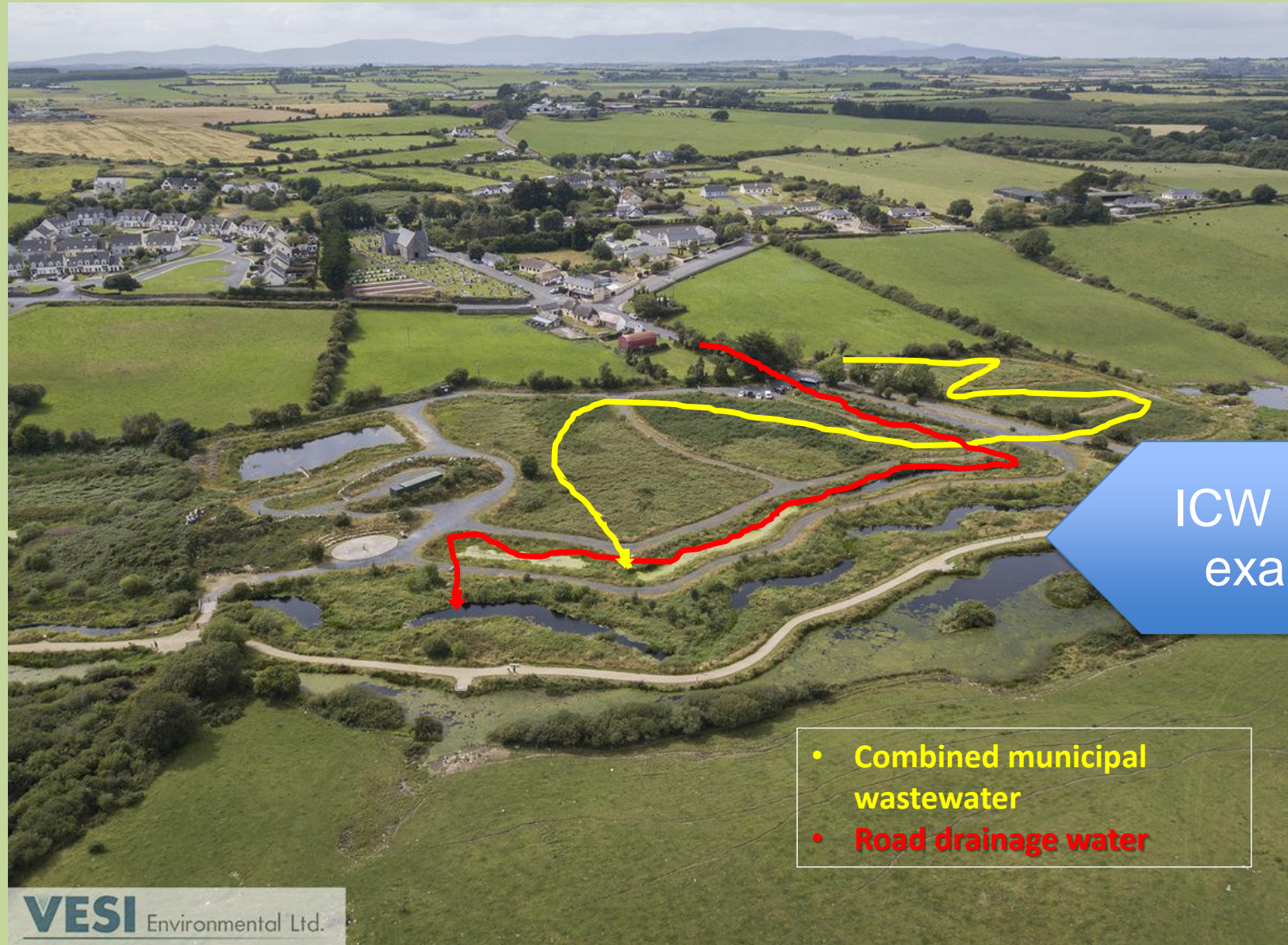
# Integrated Constructed Wetlands

## Adaptable – Any size – Any where



**Water management through the coherent reanimation of 'integrated' constructed wetland types**



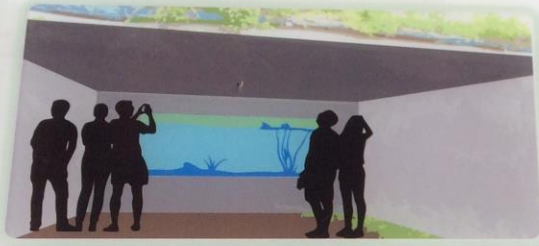


## ICW Dunhill example

- **Combined municipal wastewater**
- **Road drainage water**



# Dunhill Integrated Constructed Wetland (ICW) River Window



This River Window provides a unique view into the river that drains the Dunhill-Annestown valley catchment which is an area of 2,500 hectares. It provides an opportunity to see what animal and plant life are living in the river, which are of great importance and value to our rivers, wetlands and environment.

Since 1995, 12.5 km of the river has been re-profiled to restore lost habitats and improve its ecology. This work along with the establishment of 23 ICW systems has greatly improved the quality of water in the river and helped control flooding, further improving the biological diversity of the area.

The window allows visitors to see how life in the river may change during different stages of low flow and floods during winter and summer. This River Window is managed by the Dunhill Community's Gymkhana Club and Irish Water on behalf of the Dunhill Eugene and Carmel Dunphy of Ballinageeragh, Dunhill.

- 
**Beetle Larvae** (*Cyeticus* spp.)  
 Indicator of good water quality. Water beetles can be active swimmers, predators or scavengers. Insecticide residues can cause larvae from eating of plants directly. Foraging beetles will cause damage to plants.
- 
**Stonfly Nymph** (*Plecoptera* spp.)  
 All species of Plecoptera are indicators of water pollution and their presence in a stream or still water is usually an indicator of good or excellent water quality.
- 
**Smooth Newt** (*Ambystoma vulgatum*)  
 Newts are only found in still or slow moving water in the presence of ponds, ditches and wetlands, essential to their survival. Being an amphibian, the smooth newt depends on healthy wetland habitats for its life cycle.
- 
**Salmon** (*Salmo salar*)  
 Adult salmon travel great distances of sea to rich feeding grounds in cold, fast-flowing waters and feed on salmonids, will and herring. The salmon return to the rivers in which they were born after being at sea for one to four years. Salmon have returned to the Annestown stream in recent years, demonstrating its improved water quality.
- 
**Salmon Parr** (*Salmo salar*)  
 Salmon are known as parr once they are over a year old. They stay in freshwater for between one and four years, feeding on small insects and growing larger.
- 
**Otter** (*Lutra lutra*)  
 The otter is regarded as one of Ireland's most charismatic native mammal species. The otter is highly secretive and although widespread people tend to only get faint glimpses of the species in the wild. Individual otters are highly territorial, using droppings called spraints to mark their home ranges.
- 
**Foot's-water-cress** (*Apium nodiflorum*)  
 Apium nodiflorum is a flowering plant found in ditches or streams. It is a biennial species with green leaves which have a shape similar to those of watercress. It is not a true watercress but is used for soups, sandwiches and other dishes.
- 
**Branched Bur-reed** (*Sparganium angustifolium*)  
 Sparganium angustifolium, the branched bur-reed, is a perennial plant species in the genus Sparganium. The leaves of the reed, Phragmites, have a distinctive serrated appearance.
- 
**Common Water Crowfoot** (*Ranunculus aquatilis*)  
 Ranunculus aquatilis is a plant species of the genus Ranunculus. This is an aquatic plant, growing in areas on the surface of water.
- 
**Dragonfly** (*Anax imperator*)  
 Adult damselflies (dragonflies) are active hunters. Many are strongly territorial, some are migratory and many will actually respond to your presence. It can also be a nuisance to people when they discover that dragonflies have laid eggs for their offspring, surrounded with a fan of large ovals attracts their attention.
- 
**Common Frog** (*Rana temporaria*)  
 The Common Frog (*Rana temporaria*) is the only species of frog found in Ireland and is listed as an exceptionally important species. Frogs are protected under the European Union Habitats Directive and by the Irish Wildlife Act.
- 
**Peacock** (*Aglais io*)  
 One of the most recognizable of our native butterflies, its name refers to the prominent blue eyes on its wings. It is a very territorial butterfly, not easily disturbed by people and is therefore easier to observe (unlike the Butterfly bush (Dudleya)). This butterfly typically flies from July to September, but will emerge from hibernation seeking nectar on mild days from March onwards.
- 
**Common Carder Bee** (*Bombus pascuorum*)  
 The workhorse of Irish pollinators, the Common Carder bee is one of the most widespread and abundant bees in Ireland. Like other Carder bees, the Common Carder constructs its nest out of mud or other vegetable matter, woven together among underground grassy stems and hedgerows. It visits a wide variety of plants, but is particularly keen on downy, dandelions and vetches, and can be seen flying from March to October.

## Dunhill-Annestown valley catchment



VESI Environmental Ltd.

Comhairle Caltraich & Contae Phort Láirge  
Waterford City & County Council

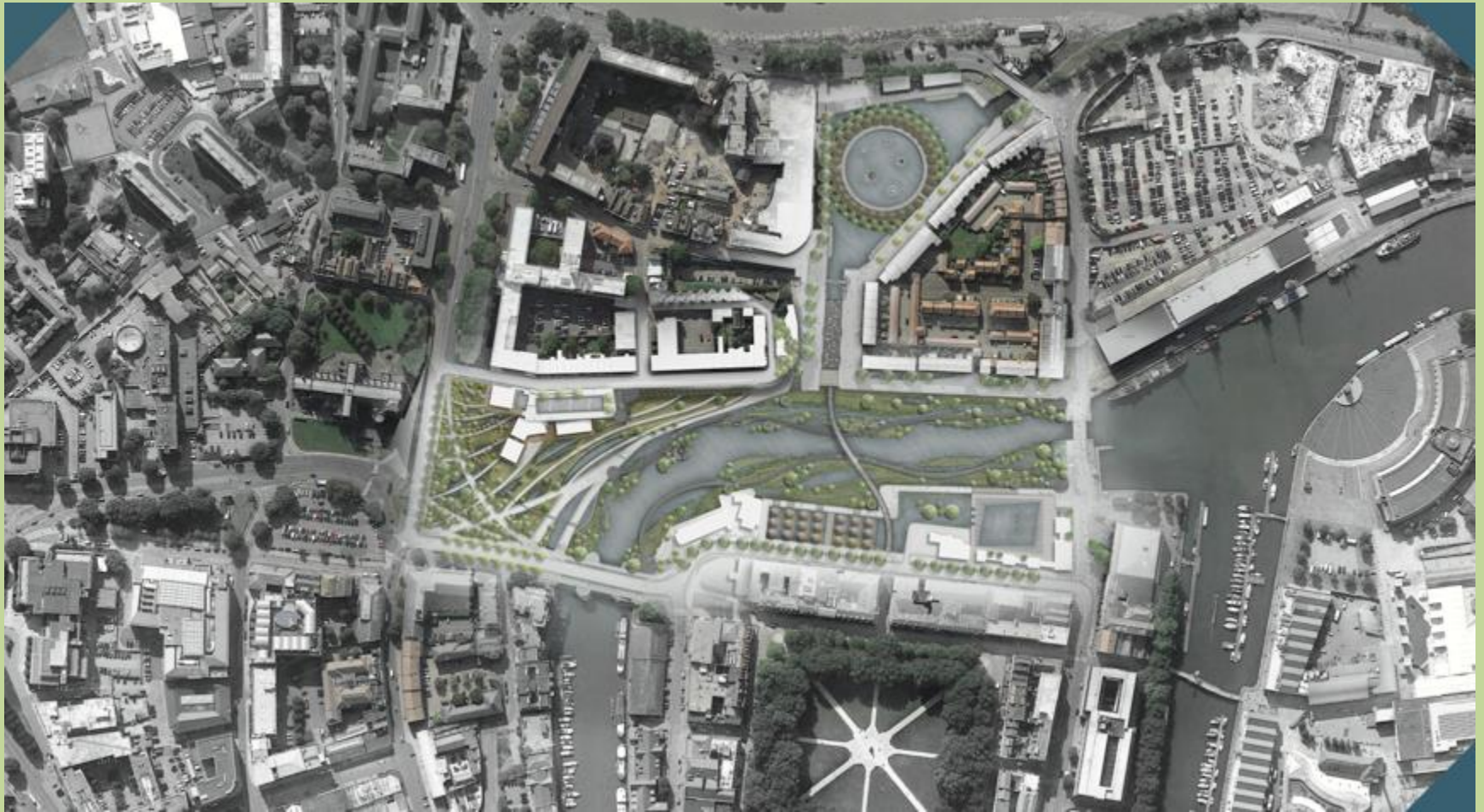


A river window design feature

# Wetland Applications Designs



# Urban Integrated Bristol Landscape Proposal



# Water Framework Drivers Environment Agency

- ICWs are ideal for smaller and rural Water Recycling Centres
- No deterioration
- Technically feasible
- Cost beneficial
- Biodiversity improvements
- Partnership delivery
  - Everyone is a winner...
  - Including the natural world
  - Don't forget carbon!

# Integrated Constructed Wetlands

## Adaptable – Any size – Any where



**Water management through the coherent reanimation of 'integrated' constructed wetland types**



# This year, we're focusing on **planning** issues in regards to **wetlands**

- ❖ To provide an overview of the latest national and **county-level initiatives** in **planning** and **best practice** related to spatial planning, development management and **biodiversity**
- ❖ To encourage an exchange of experience about **biodiversity issues in planning** amongst planners, consultees and ecological consultants in Norfolk, Suffolk, Essex and neighbouring counties

**So, let's see what we can do to make **change** with wetlands by... **Joining up the dots!****

# Catchment Based Approach Integrated Constructed Wetland Working Group

- Chaired By The Rivers Trust Central
- EA- Environmental Permitting
- Nat England – Land Use
- UK Utilities
- ICW Specialists
- UKWIR Research
- UK University Research

# Aims and Objectives

**The primary aim of the group is to understand, agree and address the key barriers to enabling the use of wetlands as nutrient control mechanisms for meeting existing and emerging water quality and environmental protection obligations.**

*A secondary aim is to understand the design and operational parameters that enable the achievement of additional natural capital and social benefits (meeting the goals of the 25 Year Environment Plan). This needs to be achieved in a way that attracts funding and financing solutions for optimising wider catchment aims, whilst achieving primary aims.*

**The group will share learning from real world scenarios to understand and resolve key barriers to the wider adoption of Integrated Constructed Wetlands. The objective being to increase the adoption of treatment wetlands through future AMP cycles.**

*The group will promote collaborative and integrated working to achieve the above aims to improve the environment as a valuable resource for business, people and wildlife.*

# PLANNING POLICY

## Our Experience



- Inconsistency of Authorities
- Unpredictable
- Differing Rules
- ***One National Standard for Integrated Constructed Wetlands***
  - ***National Working Group***
- Simple and Easy to follow
  - National Guidance

# PLANNING POLICY

## Our Observations



- **Recognition of Biodiversity**
- Planning authority assumption of NEGATIVE Outcomes with Water
- Integrated Constructed Wetlands POSITIVE outcome
  
- **Ingol Example**
- The benefits
- The Community
- Overall Wellbeing
- And above all Water Quality

# PLANNING POLICY

## Our Interpretation



- 10% Solar
- 10 % Biodiversity
- WATER SAVING / Use / Storage /
- Green infrastructure
  
- Management Challenges
- Roll Of The NGO
  
- Rewilding / Nature/ Biodiversity / Ecology
- Cost of maintenance / management

# Planning Policy Hereford Example Applicable to East Anglia

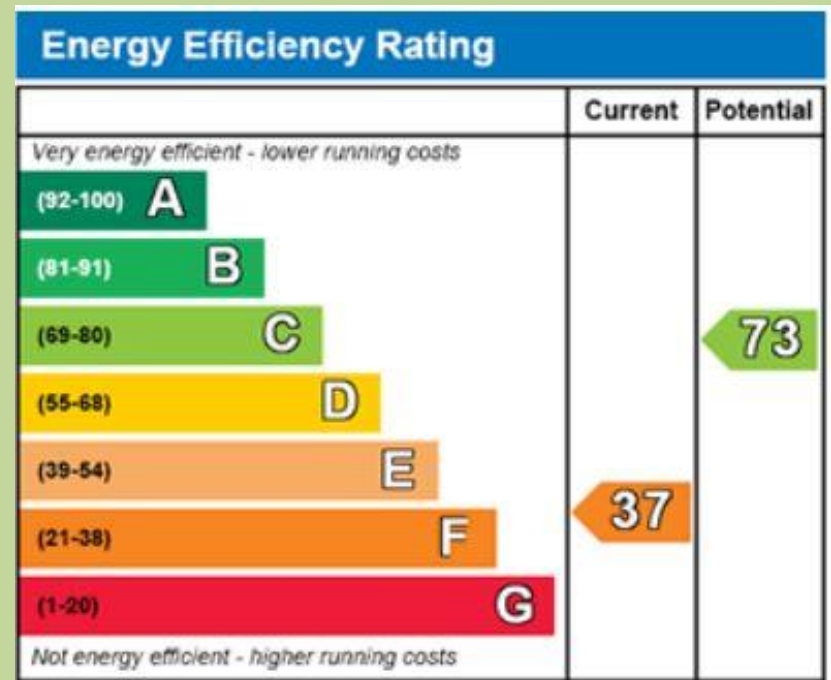
- Dutch Nitrates Ruling
- Special Areas Conservation
- Knowingly Damage
- No Deterioration
- County Infrastructure levy
- Up to £400.00 per house to pay for Integrated Constructed Wetland
- Delivered by Wye and Usk Foundation ( Rivers Trust)

I have a dream



# Housing Planning for Water

- Energy Performance Certificates
- Water Performance Certificates
- Water Smart readers – in homes



# From the outside Looking in

- Can we make it less complicated
  - Less time consuming
  - Who Benefits from all the delay?
- Do we plan biodiversity into every development ?
  - Its about the long term
- CREATE CHANGE for:
- Water -
- Soil –
- Well Being -

# In conclusion - Simple actions

- ✓ Plan to manage water resources at every level
- ✓ Plan wetlands into developments
- ✓ Create **new** wetlands
- ✓ Plan the natural world into **every** decision
  - ✓ Environmental GREEN Infrastructure
- ✓ Create the Change
- ✓ Maintain living ponds
- ✓ Let the hedges grow with the community
- ✓ Let the verges sing to the sound of life – Simple

# Ramsar wetlands

---

**Wetlands provide us with water, they protect us from floods, droughts and other disasters, they provide food and livelihoods to millions of people, they support rich biodiversity, and they store more carbon than any other ecosystem. Yet, the value of wetlands remains largely unrecognized by policy and decision makers.**

---