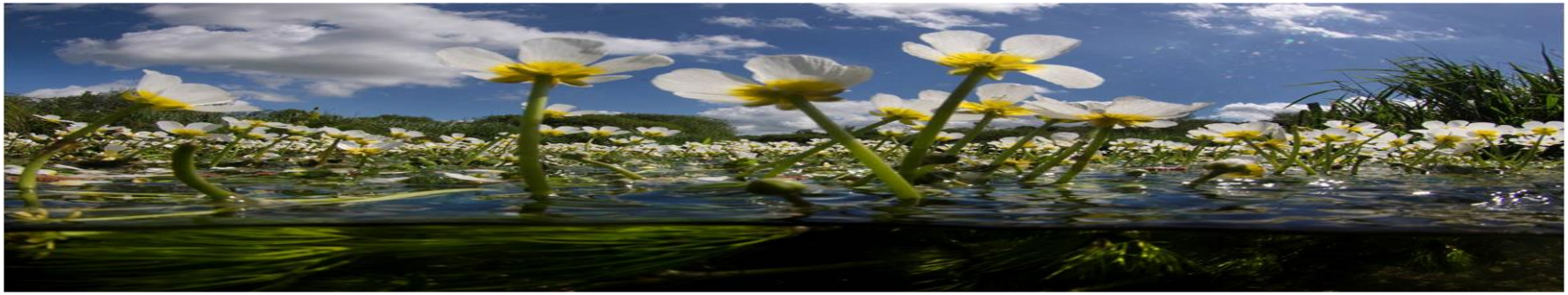


Restoration & Future Management of the River Ems

Based on projects delivered by:
the Arun & Rother Rivers Trust (ARRT) and
Wild Trout Trust (WTT)
2015/16+

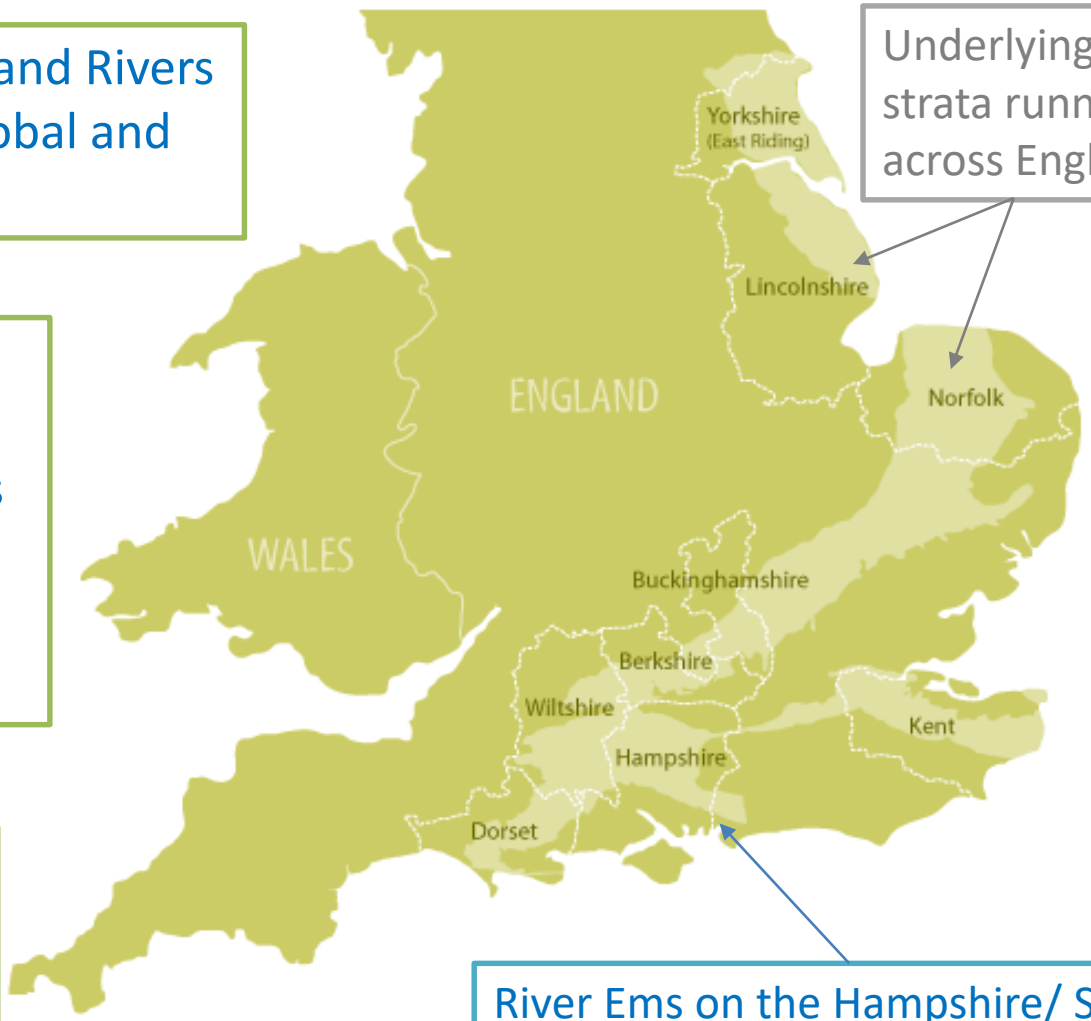
RRC Conference April'17
Ses Wright ARRT Project Officer

River Ems: Location and Geological Context

Chalk Streams and Rivers are rare at a global and local scale

Approximately 5% (12/224) of England's chalk streams and rivers are protected; many do not achieve their conservation targets

77% of English Chalk Streams are failing WFD's Good Status

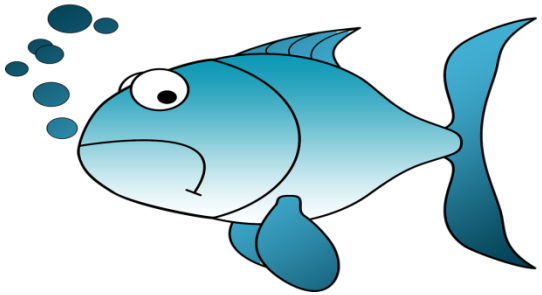


Underlying chalk strata running across England

River Ems on the Hampshire/ Sussex county border: ~8km in length mid-upper reaches ephemeral

Rationale for Multiple Restoration Projects

◦ River Ems WFD Ecological Status (2009-15): Poor



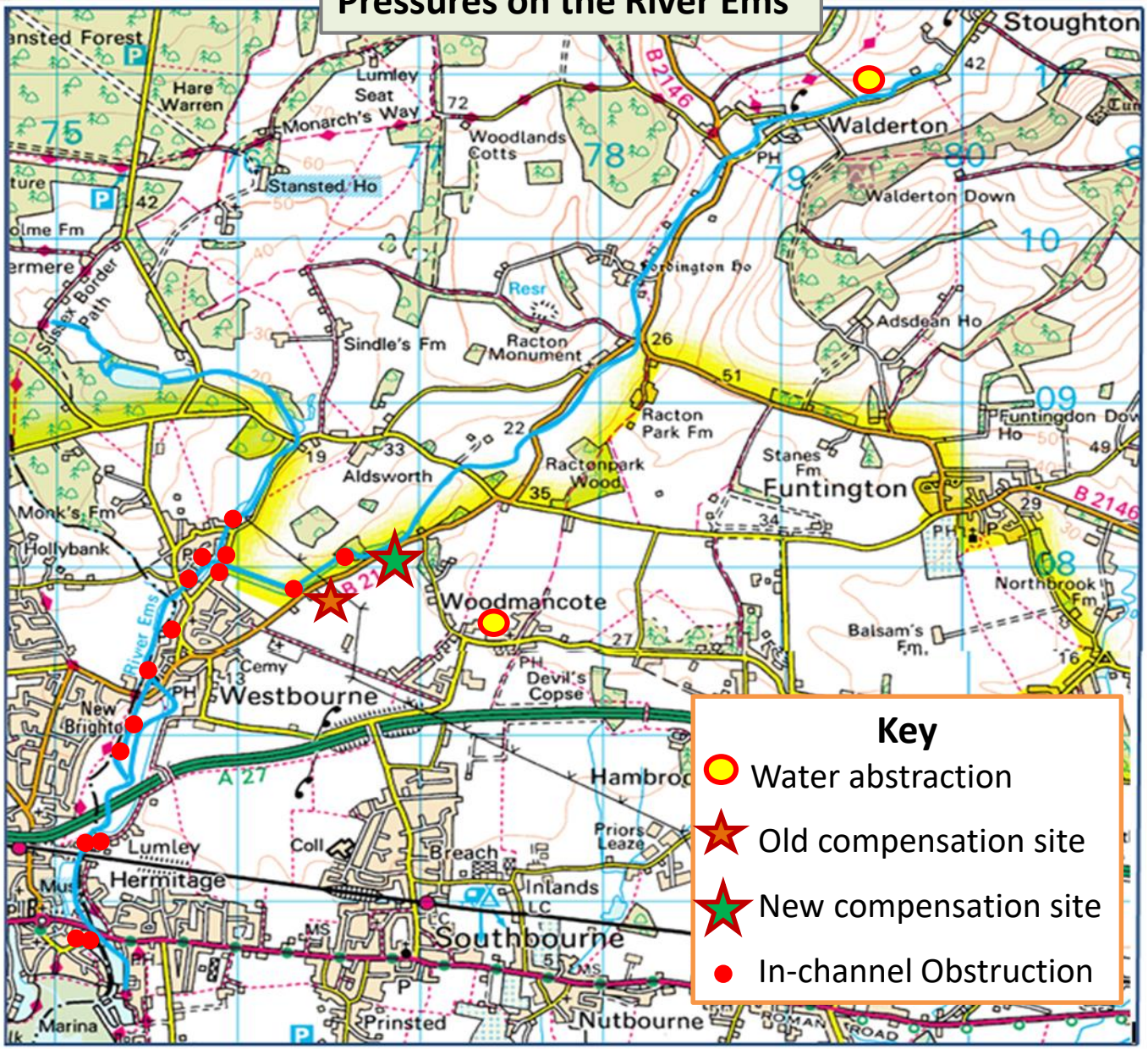
→ Failing for Fish, Dynamics of Flow (heavily modified)

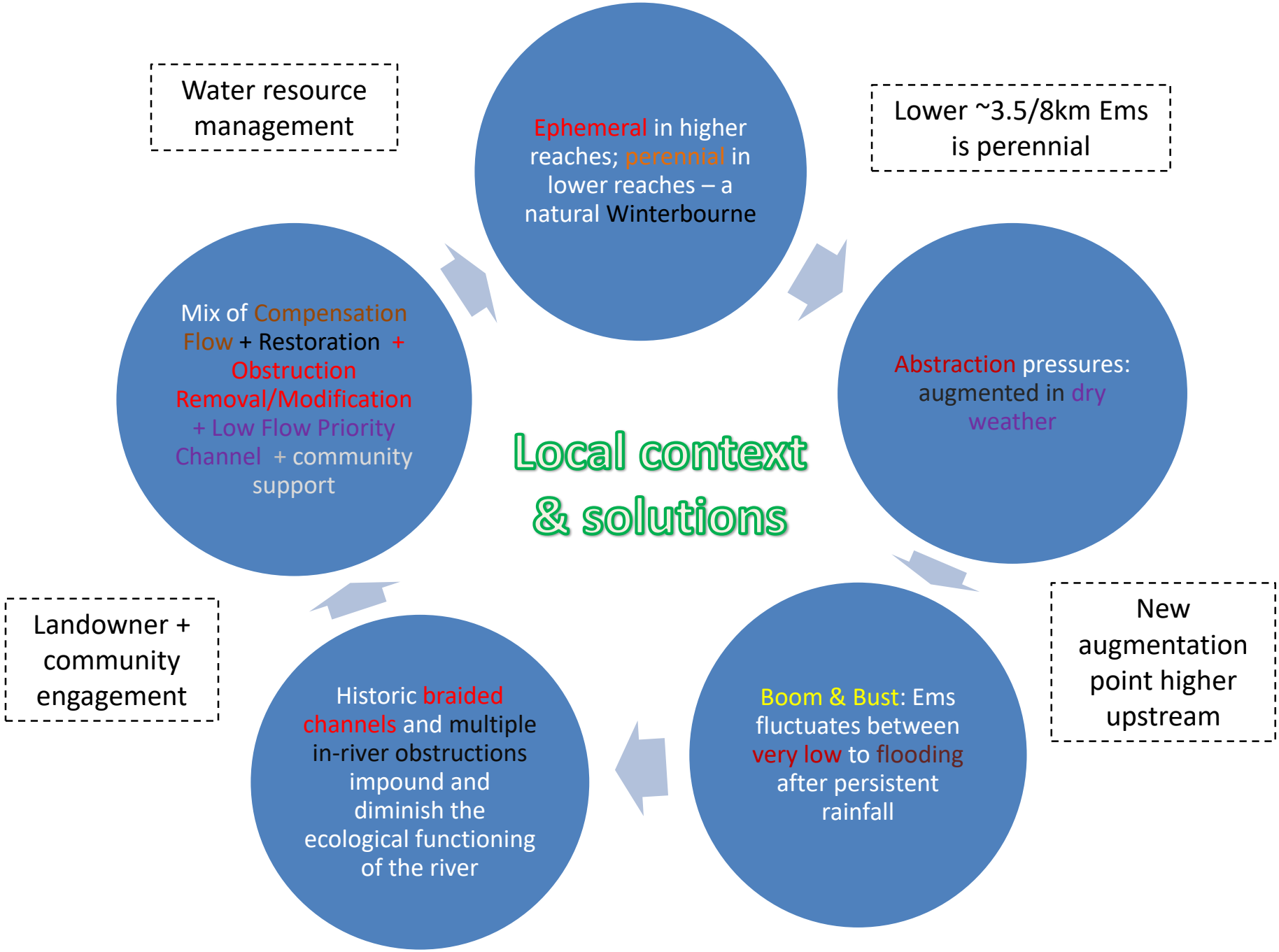
→ Due to: Resource Pressures & Obstructions

◦ Research by the EA & Portsmouth Water on the impact of abstraction support the need for river augmentation on the Ems

◦ Improved augmented flow to offset abstraction pressures combined with channel modifications and fish easements open up opportunities to restore a high quality chalk stream capable of supporting a healthy and diverse ecology

Pressures on the River Ems




Water resource management
Ephemeral in higher reaches; perennial in lower reaches – a natural Winterbourne
Lower ~3.5/8km Ems is perennial
Abstraction pressures: augmented in dry weather
New augmentation point higher upstream
Boom & Bust: Ems fluctuates between very low to flooding after persistent rainfall
Historic braided channels and multiple in-river obstructions impound and diminish the ecological functioning of the river
Landowner + community engagement
Mix of Compensation Flow + Restoration + Obstruction Removal/Modification + Low Flow Priority Channel + community support
Local context & solutions

Project Planning

Objectives to Set & Queries to Resolve:-

Objectives:

- Restore Bed Variation: increase diversity of channel morphology
- Restore Channel Sinuosity: to add dynamics of flow and natural scour processes
- Create a Low-flow Channel: to help sustain river ecology during dry periods

Pre-works Site Conditions:

→ No defined bankside (cattle poaching & historic watercress works)
→ Uniform straightened channel: how many bends and curves to design?
→ No pools or riffles; shallow depth with sluggish flow velocity throughout

Queries and questions to Answer:

→ Monitor/note changing wet-channel widths over winter and summer months
→ Estimate typical change in water depth over winter and summer seasons
→ Estimate number of pools and riffles to be created over ~300m
→ Determine width of low-flow channel and check gradient
→ Estimate depth (and length) of required pools
→ Estimate quantity of sedge/rush required for new bankside low-rise berms

Ems Priority Low Flow Channel

Watersmeet Canal taken offline

Works delivered to prioritise main Ems channel at low flows

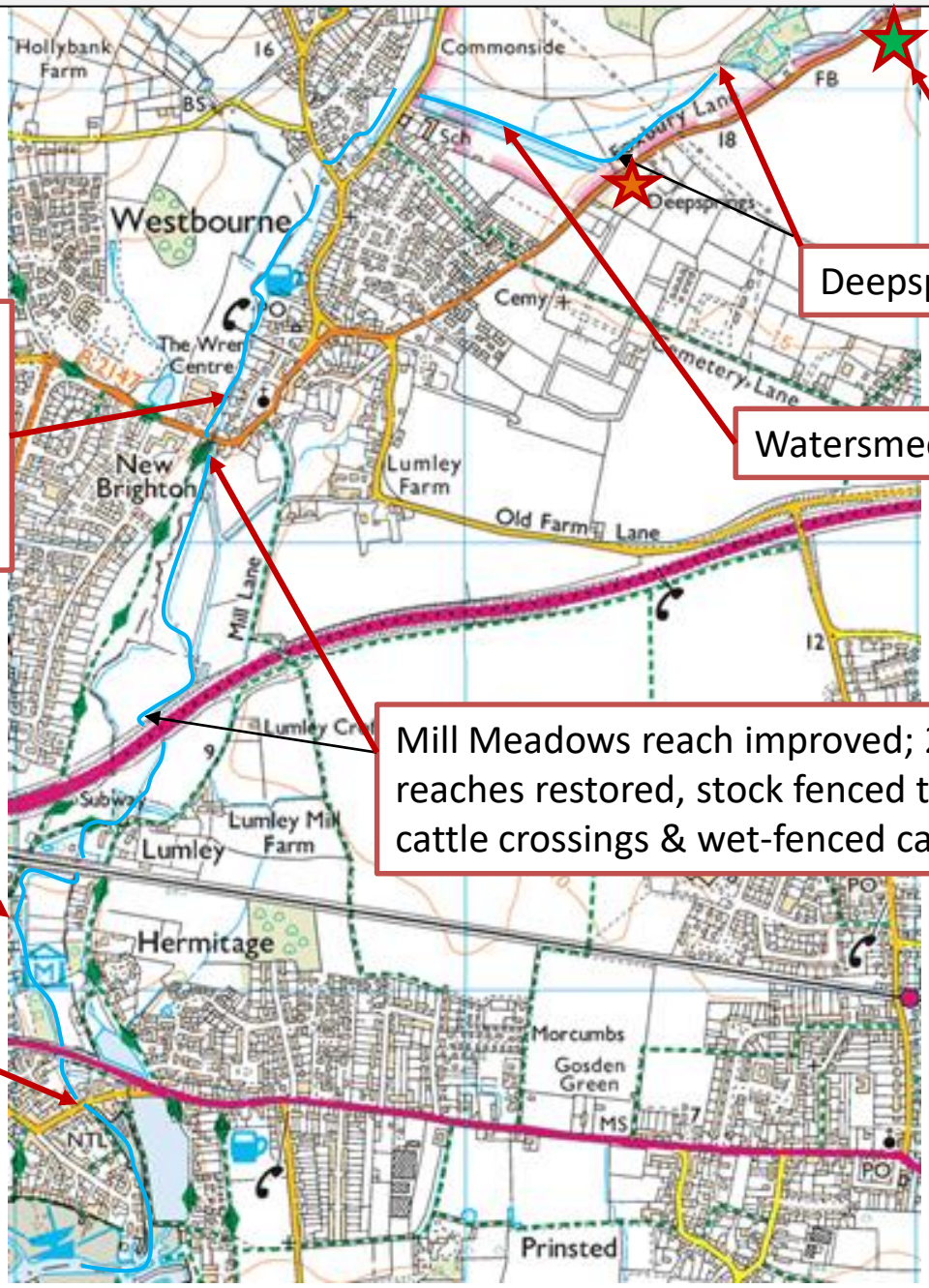
Main Ems terminates in a brick wall with 2 culverts: eastern culvert prioritised for fish passage

Tidal estuary

KEY

Ems priority low flow channel delivered through in-channel works supported by consultation with local stakeholders and the water industry

River Ems: Multiple River Improvements Delivered 2015+16



Improved flow augmentation point

Deepsprings restoration

Watersmeet Canal taken off-line

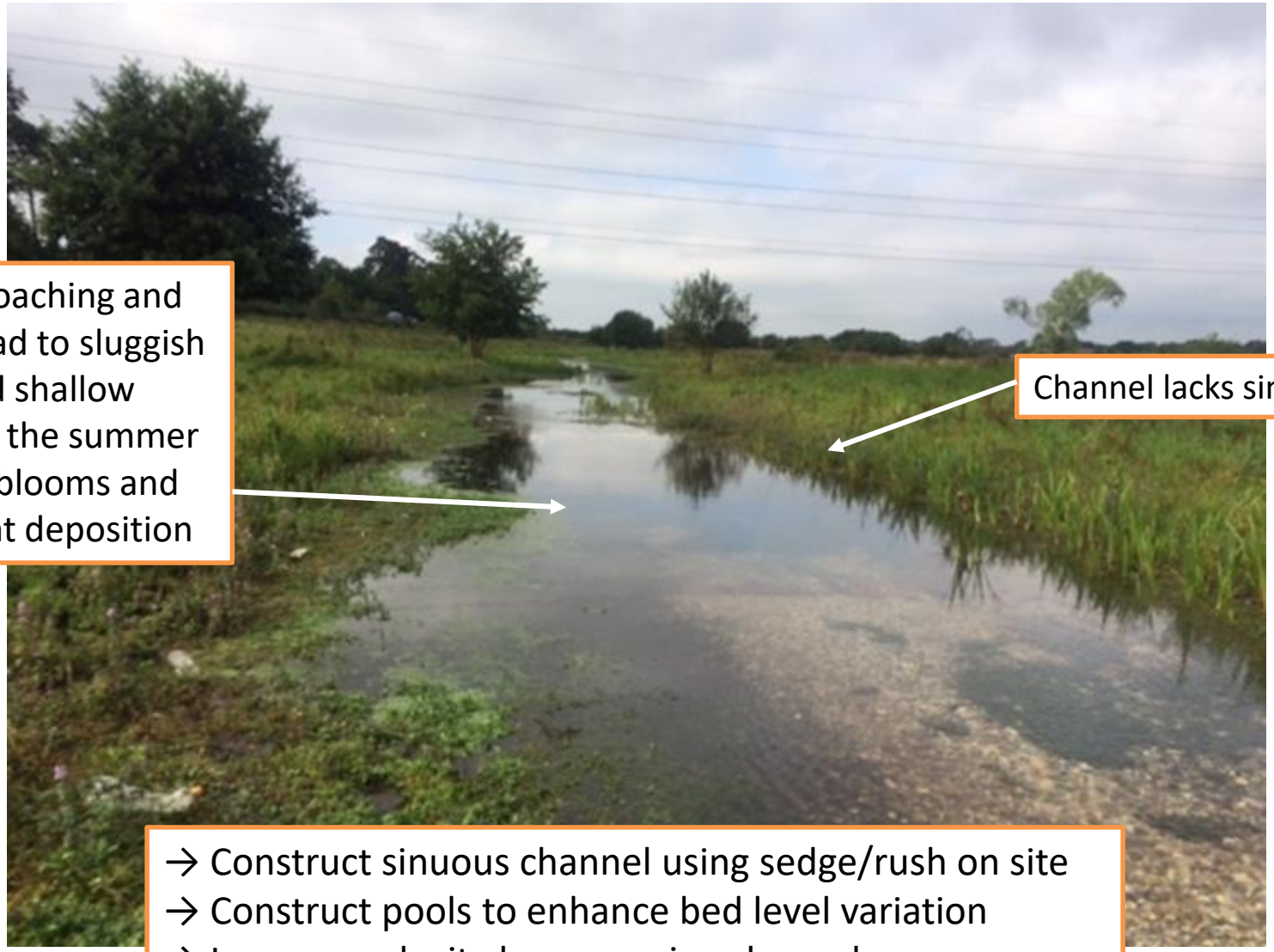
Weirs lowered and notched to improve fish passage and prioritise main Ems channel during low flows (CPAF)

Mill Meadows reach improved; 2 weirs modified, key reaches restored, stock fenced throughout plus 2 new cattle crossings & wet-fenced cattle drink

Brushwood berms and LWD flow deflectors

Culverts improved for fish passage

Deepsprings Restoration Aims



Cattle poaching and weirs lead to sluggish flow and shallow water in the summer → algal blooms and sediment deposition

Channel lacks sinuosity

→ Construct sinuous channel using sedge/rush on site
→ Construct pools to enhance bed level variation
→ Increase velocity by narrowing channel

Resources required for restoration works

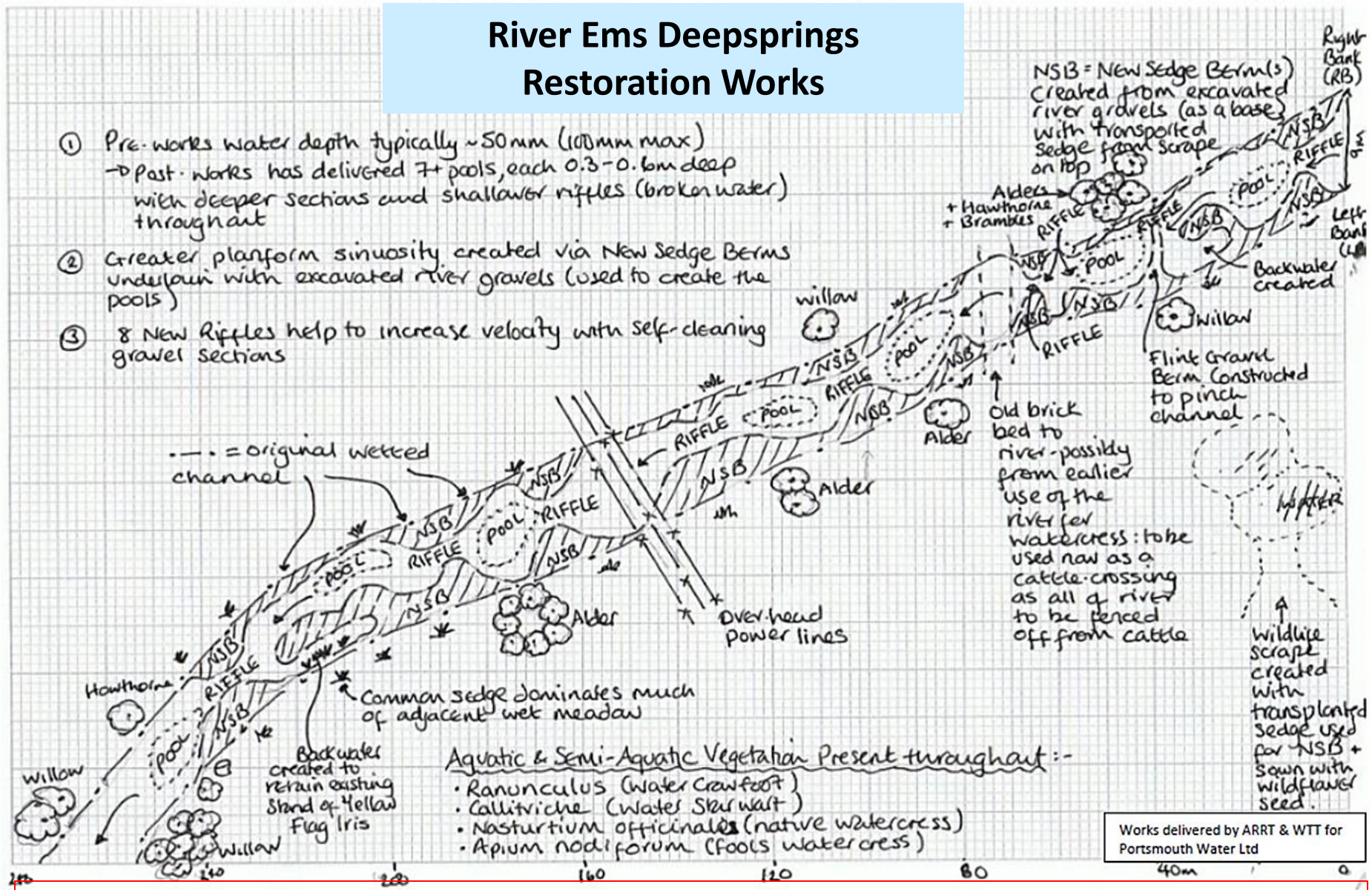
◦ 2 Excavators & 1 Dumper to break into firm flint bed for construction of pools, low-rise berms and scrape creation (2 main contractors + supervisor & planner)

◦ Natural flint gravels and bed substrate (largely compacted flint gravels, chalk, clays and pebbles) to construct low-rise shoulder berms

◦ Suitable good-rooting semi-aquatic plants to top dress over the flint berms compacted down by machines

Improved Plan Form Sinuosity, Greater Bed Level Variation & 2 Stage Channel

River Ems Deepsprings Restoration Works



→ Low-flow channel width reduced by 50-70% to accommodate low summer flows

→ Water depth increased from previous 50-100mm (max') with 7 pools (0.3-0.6m+) deep

→ 8 new riffles to increase velocity with self-cleaning gravel sections

Deepsprings: Before & After

An over-wide, shallow and uniform channel is restored with greater planform sinuosity and bed level variation with a ‘two stage’ channel to take a wider range of flows. Stock fencing delivered to stop cattle poaching and ingress of topsoil/bovine waste into the channel. Improved compensation flow site located upstream of restoration works.

Initial observed improvements: clear self-cleaning gravel reaches, flowering Water Crowfoot and increased Flora & Fauna biodiversity, Improved flow dynamics, young brown trout spotted at Watersmeet (2016), less sediment, future need for some in-channel maintenance with limited tree planting to create dapped shade

Thank you for listening to my presentation

I am happy to answer any questions you may have!

Many thanks to Portsmouth Water for funding the Deepsprings works, for the WTT who helped to deliver the works with ARRT, to the Catchment Partnership Action Fund and the Environment Agency (WFD) for the additional Ems improvement projects and to the numerous organisations and individuals who supported this project especially Portsmouth Water, the Environment Agency, Natural England and Sussex Wildlife Trust