

**The Environment Agency / DEFRA
Evidence and Measures Project**

Practical Solutions - Moston Brook

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Prepared by P Hulme and N Rukin for the Water@Leeds Diffuse Urban Pollution Workshop, 23 Apr 2013

defra



pjHYDRO
Water Management

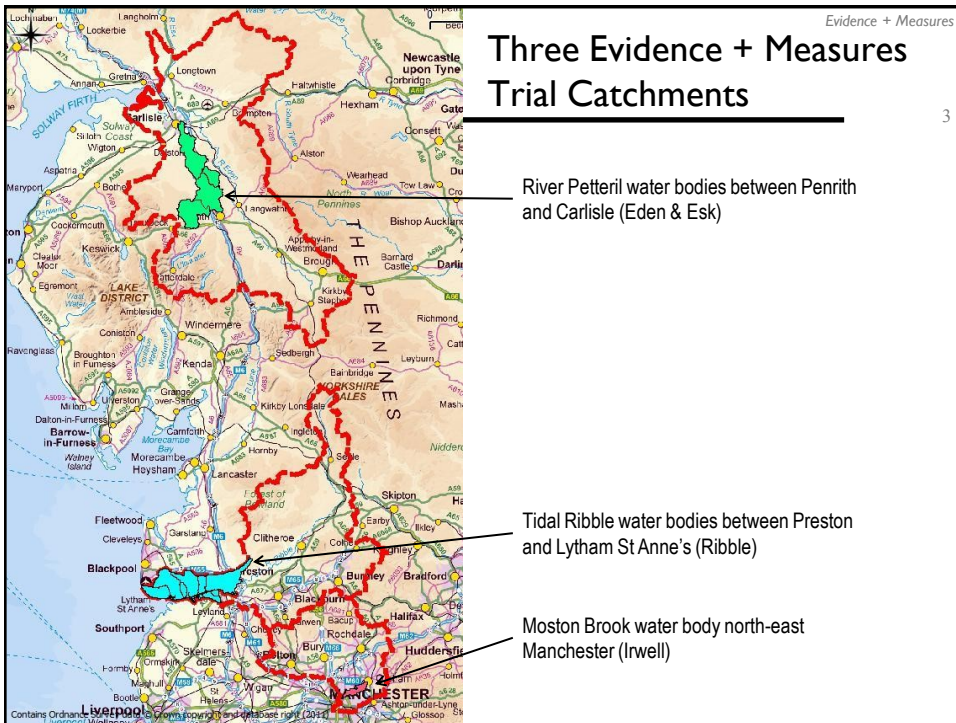
RUKHYDRO

Evidence and Measures Headlines

- **250 measures** Specific actions on the ground aimed at improving the ecological status of the 13 water bodies that we have worked on.
- **15 partner organisations** Have attended the Evidence and Measures workshops
 - United Utilities, three Rivers Trusts, Natural England, RSPB, Lancashire Wildlife Trust, three local authorities, two universities, the Environment Agency
 - Prepared to take responsibility for choosing and implementing measures.
- **Lines of existing evidence** Includes both hard data that can be plotted on graphs or maps but also softer information such as what's in anglers' dairies or people's memories.

Three Evidence + Measures Trial Catchments

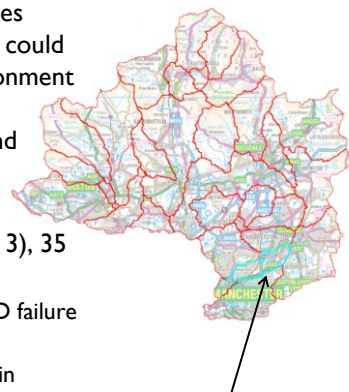
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Moston Brook Summary

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- **The project objective** To devise reliable measures which are based on existing evidence and that could be implemented in years 2 and 3 by the Environment Agency and its partners to help meet Water Framework Directive (WFD) requirements and community aspirations.
- **The result** In six months (Sep 2012 to Mar 2013), 35 participants from 11 organisations
 - Reached consensus on the main causes of WFD failure in Moston Brook;
 - Agreed on 67 measures which target these main causes of failure for submission into partners' business plans and bids for funding;
 - Time inputs over six months: 1 EA person full-time, two consultants half-time.



Moston Brook within the Irwell Pilot Catchment

Summary of the Evidence and Measures approach

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1. **Identify the problem**
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 - Collect existing knowledge
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 - o Information from EA staff and partners
2. Look at the evidence
 - Plot in time and space
 - Look for patterns
 - Gather the lines of evidence for and against each suspected cause
3. **Agree the most likely causes**
 - At Causes Workshop
 - Based on all lines of evidence
4. **Identify measures that will address these most likely causes of failure**
 - At Measures Workshop, considering:
 - Existing measures
 - New measures
5. **Get measures into business plans**
 - Agency and external partners review the list of measures
 - Partners choose actions to implement (cost-effective? funding available? achievable?)
6. **Record the consequences of the measures that have been implemented.**

Used for "difficult" catchments, where measures unclear:
 ☞ Multiple failing WFD elements (ammonia, inverts etc.)
 ☞ Multiple suspected causes
 ☞ No agreement amongst stakeholders on main causes.

Suspected Causes of WFD Failure

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Gathered from stakeholders during project:

- Landfill leachate from historic landfills
- Intermittent sewage discharges (storm overflows)
- Wrong connections (continual sewage discharges from domestic properties, sewage discharges connected to storm overflow culverts)
- Highways (runoff from M60)
- Geomorphological changes (straightening & culverts)
- Leakage from cemeteries
- Fertiliser use on parks and gardens

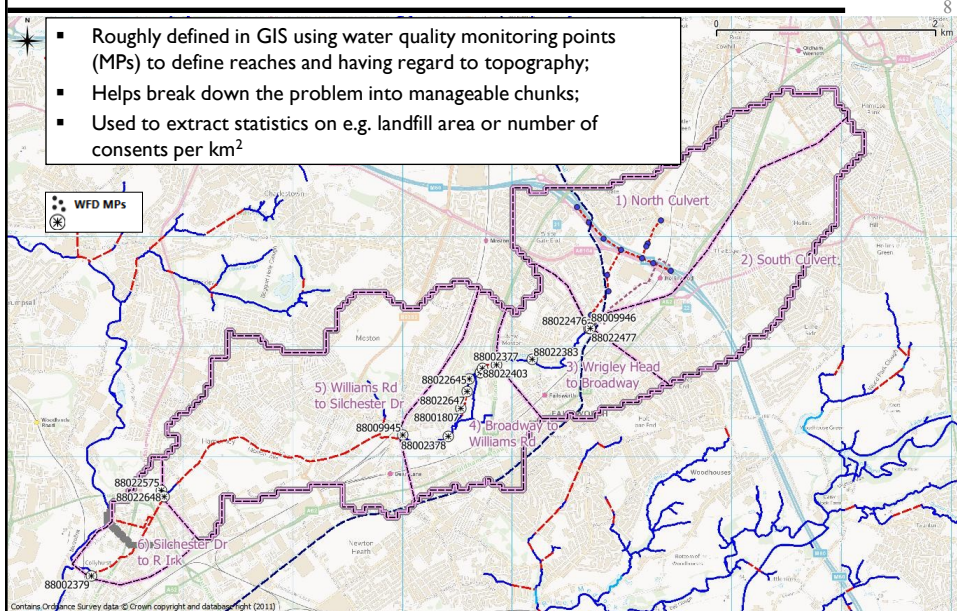
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Sub-catchments for Moston Brook



Example Evidence Table (South Culvert Sub-catchment)

Evidence related to intermittent (storm) sewage discharges

What does each piece of evidence tell us about each suspected cause of WFD failure in this sub-catchment?
 Scores: evidence supports [+], evidence opposes [-], evidence is uncertain [0], no evidence [NE], evidence not applicable [NA]

Suspected causes	Line of evidence A (variation across sub-catchments)		Line of evidence B (variation in time)		Line of evidence C (downstream changes)		Line of evidence D (source apportionment)	
	Results	Score	Results	Score	Results	Score	Results	Score
2) Intermittent (storm) sewage discharges (CSO & PSO) •Alford St Pumping Station (Improvements planned for 2015);	1) Culvert from Highways Agency drawing (Fig3.5) suggests original Bower Brook culvert heads NE-SW past Alford St Pumping Station and then connects to South Culvert outfall. (Fig3.5) 2) NIRS: Insignificant UU sewage incident (2011), Table1.2. Could be blocked CSO but not storm overflow. 3) 1990s incidents: Two sewage incidents (1993) & 1995) but not clear which culvert, Table1.2 4) A lot of sewage rags visible on culvert grid. (photo on Fig3.5) 5) Predicted annual spill volume from Alford St PSO is high, Table1.2. Spill volume significant compared to 5%ile daily flow estimate (0.073m³/s). Suggests spill will dominate flow. 6)* UU modelling shows improvements needed at Alford Street CSO and UU will complete this by 2015.	+ 0 0 +	1) PO ₄ concentrations generally increase with decreasing flow suggesting that continuous background source dominates (rather than storm-related). (Fig3.4) 2) PO ₄ concentrations at high flows (5%ile) are slightly higher than dilution of continuous inputs (see (1) above & Fig3.4) and could imply additional source at high flows e.g. PSOs 3) NH ₄ v PO ₄ plot (Fig1.7) shows higher NH ₄ which is more consistent with sewage source than landfill, but highest NH ₄ not at flows lower than 20%ile so not very high flow.	- + + -	1) No sample data upstream of this culvert. NE	1) SAGIS: CSOs major source of PO ₄ across whole of Moston Brook (~60% compared to urban ~40%). No comparison within sub-catchments but Alford St PSO marked on SAGIS map.	+	

Fig 3.9 Source Apportionment Empirical Approach
 (1) Landfill leachate inputs between Broadway and Williams Road

- Compared downstream changes in WQ
- Ratios used to provide further evidence of landfill source
- Changes in water quality with flow in Brook modelled in Excel to constrain rates of discharge.
- In this case 95 m³/day of landfill leachate with a concentration of ~67mg/l NH₄-N.
- Compares to estimated 100 m³/day leachate loss from Hardman Fold.

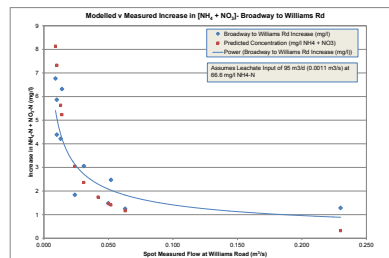
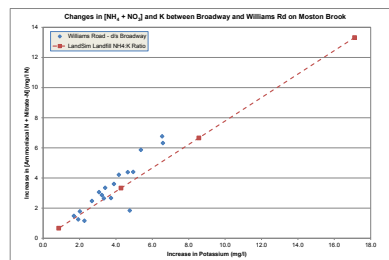
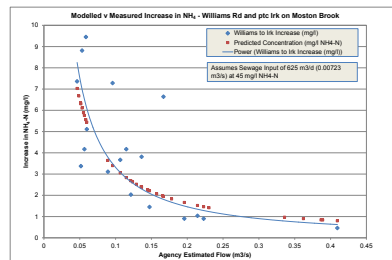
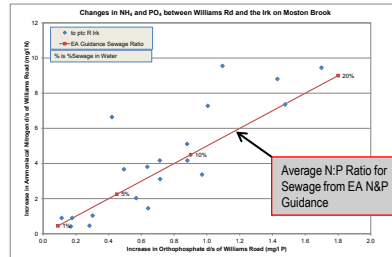


Fig 3.10 Source Apportionment Empirical Approach
(2) Sewage Inputs between Williams Road and the Irk

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- Compared downstream changes in WQ
- Ratios used to provide further evidence of sewage source
- Changes in water quality with flow in Brook modelled in Excel to constrain rates of discharge.
- In this case ~200-300 m³/day of sewage with a concentration of ~45mg/l NH₄-N.
- 200-300 m³/day of sewage | 100-1700 people, or 400-700 properties.



Summary of the Evidence and Measures approach

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Group consensus scores

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Scores from Causes Workshop for each suspected cause in each sub-catchment based on the evidence considered. Scores from 0 to 5 (white to red):

- 0 = definitely not a cause of the WFD failures;
- 5 = definitely a major cause of the WFD failures.

A high score means stakeholders consider there is enough evidence to proceed to selecting measures.

Average of the 3 "roup consensus" scoresheets						
Group	(All)		Colouring	0	3	5
Average of Score	Sub-catchment					
Suspected Cause	1) North Culvert	2) South Culvert	3) Wrigley Head - Broadway	4) Broadway - Williams Rd	5) Williams Rd - Silchester Dr	6) Silchester Dr - R Irk
1) Landfill	1.0	1.7	2.7	5.0	2.3	1.0
2) Intermittent sewage discharges	3.0	4.7	1.3	1.0	3.0	3.7
3) Wrong connections	3.0	3.7	1.7	3.3	4.3	5.0
4) Transport (including highways)	1.7	#N/A	1.3	1.7	#N/A	#N/A
5) Industrial	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
6) Retail	1.0	#N/A	#N/A	#N/A	#N/A	#N/A
7) Parks and gardens	0.7	#N/A	#N/A	#N/A	#N/A	#N/A
8) Urban	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
9) Geomorphology	0.7	0.7	1.0	1.0	1.3	1.0
10) Cemetery				1.0	2.0	

Main Causes of WFD Failure

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Sub-catchment	Main Causes	Measures
North Culvert	Intermittent sewage discharges, wrong connections	
South Culvert	Intermittent sewage discharges, wrong connections	
Wrigley Head – Broadway	Causes of failure here are mainly affecting the next sub-catchment	
Broadway – Williams Rd	Landfill, wrong connections	
Williams Rd – Silchester Dr	Wrong connections, intermittent sewage discharges	

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Main Causes of Failure and Selected Measures

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Sub-catchment	Main Causes	Measures
North Culvert	Intermittent sewage discharges, wrong connections	EA and UU act together to investigate any uncharted combined sewage overflows (CSO) and wrong connections - easy ones now, harder ones next AMP cycle. Look at Suffolk Street CSO data to ensure it only spills when it is supposed to. Check tank meets design criteria.
South Culvert	Intermittent sewage discharges, wrong connections	Display the unique ID number on each CSO to enable the public to report incidents to UU. Surface water management plans - remove surface water system connected to foul system. (Also see Note 3).
Wrigley Head – Broadway	Causes of failure here are mainly affecting the next sub-catchment	Hardman Fold: capping with suitable design, install leachate drain/interceptor & enhanced toe drain. Need full info about GMWDA infrastructure already in place. Surface water transfer from canal or surface drains to increase flow in the brook, dilute & increase resilience to pollution.
Broadway – Williams Rd	Landfill, wrong connections	Stop up and divert the drains at 2 sites; the Lancaster Club & Lower Memorial Park (refer to “Groundwork” report). Wrong connection awareness campaigns either by post or email. Influence planners and local authority to open up culverts. Remove weir and replace with rock ramp for aeration.
Williams Rd – Silchester Dr	Wrong connections, intermittent sewage discharges	Rationalisation of 6 CSOs into 2 in culvert between Kenyon Lane and Potters Lane. EA to attend Category 3 pollution incidents that have been identified as a risk in Moston Brook (for sewage).

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Measures on Ribble Life Action Plan

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Ribble Life



Enter search terms Go

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Home

Action Plan

Status: -Any- Partners: Environment Agency Catchment: Lower Ribble Theme: Habitat Quality

Only my flagged actions: False [Reset](#)

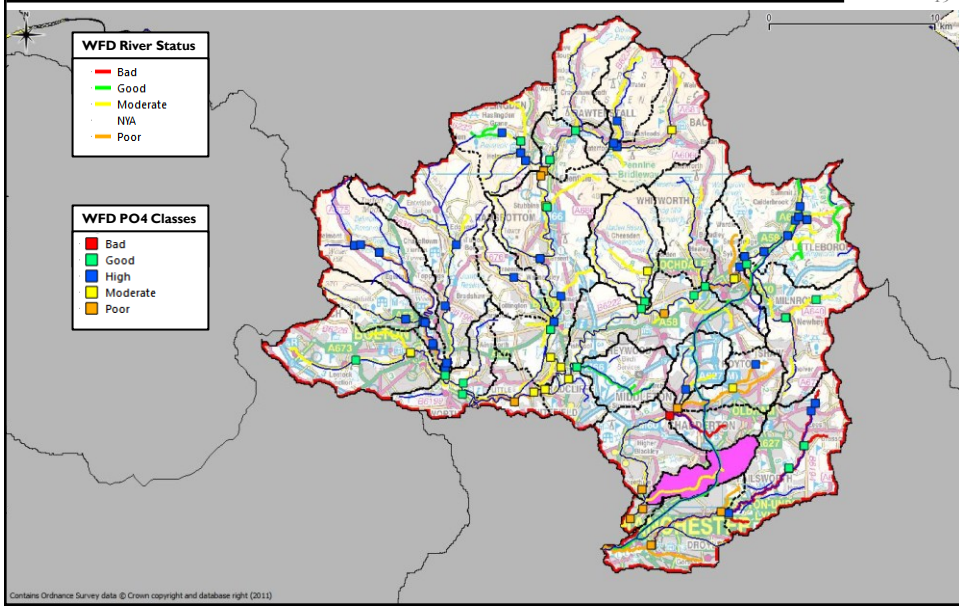
Catchment	Objectives	Actions	Targets	Timescale	Theme	Sub Theme	Status	Partners	Comments	Flags
Lower Ribble	Improvements to channel morphology in Main Drain. Planform and cross-section to increase habitat availability (also Annex B mitigation measures)		1. Plan action and secure funding. 2. Deliver actions	Unknown at this stage.	Habitat Quality		Not started	Environment Agency, Ribble Rivers Trust (RRT), Wildlife Trust		View
Lower Ribble	Improve in-channel morphological diversity along Liggard Brook channel to improve habitat.		1. Plan action and secure funding. 2. Deliver actions	Unknown at this stage.	Habitat Quality		Not started	Environment Agency, Ribble Rivers Trust (RRT), Wildlife Trust		View

Rationale: Morphology of Main Drain is poor and needs improvement.

Theme: Habitat Quality

Partners: Wildlife Trust
Ribble Rivers Trust (RRT)
Environment Agency

Scaling up: e.g. Irwell Pilot Catchment



Evidence + Measures: working with stakeholders to select measures based on existing evidence

Any questions?

Photos: Ann Bates, Moston Brook Project Officer, Partnership Project - Oldham Council & Manchester City Council

