

**Evidence Table**

*What does each piece of evidence from the data analysis tell us about each candidate cause (threat)?  
Evidence supports [+], evidence opposes [-], evidence is uncertain [0], no evidence [NE], evidence not applicable [NA].*

Candidate causes of WFD failures (threats to target biology)	RFF	Survey	RFF status (Whole WB)	Reach 1
<b>Agriculture</b>				<p><b>Source apportionment</b> [+] SAGIS suggests "rural" inputs alone would lead to only borderline "Good (/Moderate)" WFD Status upper 3 reaches [Fig 3a SAGIS mg l Chart]. (At Callerton, SAGIS rural inputs account for 30-50% of that measured).</p> <p><b>Variation in space</b> [+] 88% of the land use in this reach is agricultural (arable, horticulture &amp; improved grassland). This is rank #1 out of the 6 reaches.</p> <p><b>Pollution incidents</b> [-] No agricultural NIRS [7a. Fig Rch 1 NIRS 2001-14].</p> <p><b>Other</b> [0] 2012: "Runoff from the surrounding agricultural fields is likely to cause the excessive growth of rank vegetation on the banks." (In River Restoration report December 2014, Restoration, flood retention and enhancement options, p10 - Callerton village (Section 1) - NGR: NZ176685 – NZ179690). [-] 07/03/12 and 03/05/2012 Source of Ouseburn rising in mixed improved and rough grazing with arable also in catchment has low (&lt;0.5mg/l) NH4-N at low flows and low (≤0.07 mg/l) lab PO4-P at mean flows respectively. (EA Field Survey, location 1). [-] 15/11/2011 to 03/05/2012 Trib North of Stamfordham Road runs through mixed arable and pasture has variable moderate to low lab PO4-P (0.2 mg/l at low flows to 0.06 mg/l at higher flows). NH4-N is low (&lt;0.5mg/l). (EA Field Survey, location 2). [Fig 5b. Rural Lab P v Flow Cht].</p>
Agricultural (diffuse pollution) [e.g. runoff from grassland, manure heaps, farmyards?]		y		[+] oPO4 at Callerton visually correlates with NH4-N suggesting a sewage or livestock / slurry source [Fig 4a]. (Note this sample point could include both agricultural and sewage sources).
Arable field (diffuse source) [incl. sediment (Current Situation doc & WB Action Plan)]	y		Probable / Suspected	[+] oPO4 to T.I.N ratios are much lower than for sewage (or slurry) and more consistent with a higher nitrate agricultural / fertiliser signal [Fig 4e. U s Wal to Cal (DPO4 v DTIN)] (Note this sample point is in the headwaters upstream of sewer networks).
<b>Sewage</b> (in general) [phosphate highlighted]		y		<p><b>Variation in time</b> [-] No sewage incidents were recorded between 2006 and 2014. [Fig 7b. Rch 1 Sewage NIRS91-4]vT]</p> <p><b>WQ correlations</b> [+] WQ (oPO4) at Callerton suggests large non rural input - possible evidence for sewage inputs [Fig 3a. SAGIS mg l Chart (2)]. [+] oPO4 at Callerton visually correlates with NH4-N suggesting a sewage or livestock / slurry source [Fig 4c. Callerton PS oPO4 v N]. [-] oPO4 to T.I.N ratios are much lower than for sewage (or slurry) and more consistent with a higher nitrate agricultural / fertiliser signal [Fig 4e. U s Wal to Cal (D PO4 v D TIN)]</p> <p><b>Variation in flow</b> [+] Sewage incidents at moderate to higher flows and related to sewers. So sewer capacity problem? [Fig 7c. Rch 1 Sewage NIRs v Flow].</p> <p><b>Pollution incidents</b> [+] NIRS: Two sewage incidents (one cat'3, one cat'4), rank # 6 (the lowest) compared to other reaches[Fig 7a. Rch 1 NIRS 2001-14]. One is related to crude sewage and the other to other sewage materials [Fig 7d. Reach Sewage Poll Type (No)]. [0] One additional incident for domestic &amp; residential (unauthorised discharge of sewage materials, final effluent, 26 May 2005) in EA "top reach" (source to A1 road bridge at grid ref NZ2264869933) so could be in Reach 1, 2 or 3.</p>
Sewage discharge (diffuse source) [e.g. sewer network & BOD mentioned in Current Situation doc]	y		Suspected	<p><b>Pollution incidents</b> [+] NIRS Premises: One incident relates to foul sewer at high flows [Fig 7c. Rch 1 Sewage NIRs v Flow] [+] NIRS Premises: One incident relates to other water industry premises at moderate flows [Fig 7c. Rch 1 Sewage NIRs v Flow]</p>
Sewage discharge (intermittent, point source) [sewage treatment works (STWs), storm discharges, CSOs & PSOs]	y	y	Suspected	<p><b>Variation in space</b> [-] No CSOs [-] No STWs [0] North Walbottle Pumping Station has an overflow (PSO) upstream of the Callerton sampling point. [8a. Consents Reach 1]</p>
Sewage misconnections [phosphate highlighted]		y		<p><b>Variation in flow</b> [-] WQ logger data at Callerton suggests occasional pulses of NH4-N unrelated to flow events. Evidence against misconnections [Fig 4g WQ Logger NH4 Callerton only]</p> <p><b>Pollution incidents</b> [-] No polluted SW outfalls recorded.</p>

Candidate causes of WFD failures (threats to target biology)	RFF	Survey	RFF status (Whole WB)	Reach 1
Septic Tanks (non-mains sewerage)				<b>Source apportionment</b> [-] SAGIS shows inputs of oPO4 from septic tanks are insignificant. [Fig 3b. SAGIS kg yr Chart]. This is consistent with very few properties that are > 100 m from sewer network [Fig 1a. Base Map].
<b>Transport</b>				
Transport network		y		
Road runoff – diffuse source	y	y	Confirmed	
<b>Urban areas</b>				
Drainage (housing) – diffuse source [BOD highlighted in Current Situation doc & WB Action Plan]	y		Confirmed	
Drainage (mixed, diffuse source)	y		Confirmed	
Increase in impermeable areas from new housing		y		
New urban development [upper & middle reaches mentioned]		y		
<b>Other</b>				
Trading / Industrial Estates – (diffuse source)	y		Confirmed	
Airport		y		[-] Not present
Golf course				[-] Not present