



**VISUAL SURVEY OF EXPOSED RIVERINE SEDIMENTS (ERS) IN THE  
DANE, WEAVER AND BOLLIN CATCHMENTS**

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SOUTH AREA

**Cover Photograph:** Large, high-quality point bar on the River Bollin near Prestbury.

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## **EXECUTIVE SUMMARY**

Visual surveys of the River Dane downstream of the confluence with the Swettenham Brook, the River Weaver, and the River Bollin catchment in the EA Northwest South area were undertaken between 3<sup>rd</sup> and 9<sup>th</sup> February 2005 with the aim of identifying the spatial distribution and relative quality of exposed riverine sediments (ERS). The potential value of these ERS in terms of likely habitat quality for ERS invertebrate communities was determined by recording a suite of appropriate environmental variables. Following an initial cartographical analysis of reaches likely to contain ERS, tens of kilometres of riverbank were inspected and 67 areas of ERS were selected for detailed visual survey. Site characteristics ranged widely both between and within catchments, with habitat quality ranging from poor to very high. On the River Weaver ERS were of low to medium quality and were almost exclusively sandy. ERS on the River Dane were of generally better quality, and could be typically classified as medium quality, with some stretches containing high quality habitat with a mix of gravel and sand sediments. The River Bollin was typically characterised throughout most of its length by low quality habitat, however the reach between Macclesfield and Wilmslow contained many areas of high quality ERS, with two fairly extensive sections containing large areas of ERS of very high quality. Sites are ranked according to quality and recommendations for potential invertebrate survey sites and methods are made.

## 1. INTRODUCTION

Exposed riverine sediments (ERS) can be defined as: *within channel fluvially deposited sediments (gravels, sands and silts) that lack continuous vegetation cover, whose vertical distribution lies between the levels of bankfull and the rivers typical base flow*. This means that areas of the riverbed exposed under exceptionally low water levels cannot be classified as ERS, but unvegetated eroding riverbanks can be, and often provide additional habitat for many species characteristically found on river bars. ERS represent one of the last remaining semi-natural habitats in the highly managed UK landscape (Eyre and Lott 1997), and are habitat for a large number of specialized (e.g. Andersen, 1968, 1969, 1978) and rare (e.g. Plachter, 1986; Fowles, 1989; Godfrey, 1999; Sadler *et al.* 2004) invertebrates. Just considering the 131 specialist beetles of ERS in the UK for example, 86 (66%) have some conservation status, with 29 classified as red data book (RDB2, RDB3, RDBI and RDBK) and 57 classified as nationally notable (Na, Nb and N) by Hyman and Parsons (1992; 1994). Moreover, eight species (Carabidae: *Bembidion testaceum* (Duftschmid, 1812); *Lionychus quadrillum* (Duftschmid, 1812); *Perileptus areolatus* (Creutzer, 1799); *Dyschirius angustatus* (Ahrens, 1830); Staphylinidae: *Meotica anglica* Benick in Muona, 1991; *Thinobius newberyi* Scheerpeltz, 1925; Hydrophilidae: *Hydrochus nitidicollis* Mulsant, 1844; Dytiscidae: *Bidessus minutissimus* (Germar, 1824)) have biodiversity action plans (Anon. 1999), for which the EA is the lead partner for all species except *D. angustatus*.

Recent ERS invertebrate survey work has been widely distributed, but the only areas that have enjoyed high coverage are the South West of England, Wales, and parts of Scotland (e.g. Eyre 1998; Sadler and Petts 2000; Bell and Sadler 2002; Sadler and Bell 2002). The only substantial survey of ERS invertebrates in the EA Northwest South region remains that of Bell and Sadler (2003) on the Upper Dane. This paucity of regional survey work is most likely due to the highly built up nature of the region, which has consequentially led to high levels of regulation, channelisation and pollution on the region's rivers, all of which are characteristics that lower the quality of, or completely destroy ERS. In this context, any areas of high quality ERS found in the EA Northwest South region are likely to have considerable regional conservation significance.

The primary aims of this survey were to provide a visual assessment of the invertebrate potential of ERS within the EA Northwest South region and to identify the most important sites for future survey work. EA staff experience, information from maps and the experience of the author suggested that areas of the River Dane, the River Weaver, and the catchment of the River Bollin were likely to contain the best quality sediments. However, the River Dane upstream of the confluence with the Swettenham Brook (SJ 790 672) had already been examined during 2003 (Bell and Sadler 2003), so this area was excluded from the survey. The recording of environmental variables that are considered important for the maintenance of a high quality invertebrate fauna enabled individual patches and complexes of ERS to be evaluated. Thus, the distributions of low, medium, high and very high quality potential sites throughout the survey reach were documented. This information was used to pinpoint the best quality sites for future survey of the ERS invertebrate fauna.

## **2. METHODS**

### **2.1 Site Selection**

Sites were selected using the experience of local agency officers and the author. Areas that tend to contain the best quality ERS are in river sections where there is a rapid reduction in river gradient as they move out of their headwaters, in tightly meandering sections, downstream of major confluences, and in sections that are highly unstable. To a certain extent these characteristics can be identified from maps (e.g. presence of oxbow lakes for the latter) so an initial cartographical survey was used to further concentrate survey efforts on the river section most likely to contain the best ERS. There were three additional constraints on eventual site selection for survey: (1) identifying the landowner, (2) obtaining an audience with the landowner, and (3) getting permission from the landowner, but this was generally not too problematic.

### **2.2 Seasonal Considerations**

There are both advantages and disadvantages associated with a winter visual ERS habitat survey. The comparative lack of riparian vegetation makes walking the banks easier, and allows areas of ERS to be more easily spotted. However, it is sometimes hard to tell how much of an exposed area is likely to be heavily vegetated come the summer months when most ERS invertebrates are active, which makes it more difficult to adequately assess the habitat potential. The variables percentage vegetation cover and shading were therefore estimated keeping in mind how much vegetation would be likely to develop. A further disadvantage when surveying during the winter is that most livestock are not in the fields at this time of year, so it is difficult to estimate the level of likely grazing damage for each patch of ERS. Therefore the tendency for livestock to gain access to each ERS patch and the likely sensitivity of that patch to grazing damage has also been assessed.

### **2.3 Survey Methods**

Bars were surveyed between 3-9/2/2005 during water levels that were typically around winter base flow, except on 6-7/2/2005 when rainfall over night (5/2/2005) increased water levels around 10-20cm above this level (base flow is roughly demarcated by the presence of algae on river gravels). Bars were sometimes

surveyed from the opposite bank, which given the relatively small size of these rivers, seemed an appropriate trade-off for the amount of time it would take to travel around to the other side of the river when it was not wadeable because they could still be quite accurately surveyed.

All ERS surveyed were photographed and the grid reference at the centre of the bar identified to an appropriate level of accuracy (to 10-figures when access to the bar was possible, but to an 8-figures when it was not) using a Garmin 12 Channel Global Positioning System (GPS). Each ERS was surveyed using a form that contained the information shown in the appendix. This form was originally based on relevant parts of the river habitat survey methodology as identified by Eyre and Lott (1997), but has been considerably refined by the research groups recent experience (e.g. Sadler and Petts, 2000; Sadler and Bell 2002; Bates *et al.* 2005). The record sheets contain information on variables considered to be of importance to ERS invertebrates.

Variables known to be of particular importance to ERS invertebrates are the diversity and calibre of sediments, shading, vegetation cover and grazing intensity (e.g. Andersen 1969; Hammond 1998; Sadler *et al.* 2004). Particular attention was paid to the physical structure of each ERS. Many of the environmental variables are self-explanatory, but it is worth expanding on some of them here. Vegetation type was categorised as (1) bare, (2) simple (predominantly annuals and short-lived perennial herbs), or (3) complex (other perennial species, e.g. gorse, and trees, in addition to 2). ERS profile was categorised as (1) flat (very low angled, low-lying ERS), (2) gentle (more elevated without avalanche faces at the bars edge), or (3) steep (avalanche faces at some point at the bars edge). ERS topography was categorised as (1) simple (flat and had no break of slope), (2) hummocky (clear mounds of sediment), and (3) complex (flat areas, hummocks, and backwaters). Habitat heterogeneity was something of a summary variable of vegetation type, ERS profile, ERS topography and sediment diversity, and was based on the number of distinct microhabitats (e.g. downstream sandy areas, avalanche faces, silty fringes). Hibernation potential was scored on a scale of 1-3, where 1 showed the lowest hibernation potential and 3, the highest (in terms of the availability of grass tussocks, dead wood and heavy vegetation). The availability of dead wood and grass tussocks both on the bar and on the bank was individually graded because of the known importance of these resources for hibernation (Luff 1966; Andersen 1968). Stocking densities were categorised as



(1) light (livestock present but fairly limited damage to ERS), or (2) heavy (either heavy stocking relative to area, or light stocking but damage concentrated on ERS because, for example, ERS provide the only access to the water for drinking, leading to chronic heavy damage to ERS). The substrate size categories adhere to those defined by Wentworth (1922).

Any anthropogenic disturbance factors such as recreation, channel management, bank profiling, trampling (human or livestock) and other damage to ERS were also recorded, as these can have a clear and immediate physical impact on the habitat available to invertebrates. Additionally, the practicalities of invertebrate sampling were taken into account when assessing each site, for example, whether pitfall traps would be likely to be vandalised, or very easily flooded were noted. ERS specialist beetles have been shown to occupy several ERS patches in their lifetime (Bates *et al.* 2005; Bates *et al.* unpublished) so a proximity to other patches of ERS, perhaps of different character may be important. This is especially so on the relatively small rivers surveyed because ERS patches were generally small. Therefore when there were several small areas of ERS in close proximity to each other these were grouped and surveyed together as an ERS complex, and even when bars were not grouped the proximity and quality of nearby ERS was noted.

Physical habitat diversity, the level of trampling, the availability of unvegetated sediments, the size and ease of inundation of the ERS, the quality of surrounding habitat and hibernation potential were all taken into account when assigned the status low, medium, high, or very high quality habitat. Additional practicalities such as whether or not it was feasible to use pitfall traps due to vandalism, livestock trampling or inundation likelihood were taken into account when recommending bars for further study. The need to sample as wide a range of habitat types, over as wide a geographical area as possible (to maximise the diversity of habitats and therefore, species, and to get as wide a survey coverage as possible) were also taken into account when recommending sites for further study.

### 3. RESULTS

#### 3.1 The River Dane

##### 3.1.1 Surveys

###### *Stockery Park Farm 1 (7/2/05) D1*



Grid reference: SJ 78767 67314

Landowner: Joanne Beresford, Stockery Park Farm, Marsh Lane, Holmes Chapel, Crewe. CW4 8AS

Access: A54 from Congleton, turn right ~2km before Holmes Chapel, parking in farm yard (SJ 786 668)

Habitat summary: Only slightly exposed on this date, but potential to be a large bar if water levels fell ~0.3m. Reasonable habitat potential, but evidently easily inundated and open to potentially heavy grazing. Very close to Bell and Sadler's (2003) Pinfold Rough site (site 6), which is of much better quality.

Habitat quality: **Medium**

###### *Stockery Park Farm 2 (7/2/05) D2*



Grid reference: SJ 7892 6718 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: A quite large, predominantly sand bar with complex willow vegetation. Reasonable habitat potential, but it looks like most of the bar will vegetate over during the summer and livestock are likely to have access (although the size and dense willow vegetation will protect the bar to some extent). Very close to Bell and Sadler's (2003) Pinfold Rough site (site 6), which is of much better quality.

Habitat quality: **Medium**

*Woodhouse Farm 1 (6/2/05) D3*



Grid reference: SJ 78671 67341

Landowner: Mr WV Ford, Bellfields Farm, Congleton Road, Holmes Chapel, Crewe. (Father in law to the owner of Woodhouse farm, landowner)

Access: A535 out of Holmes Chapel, turn right along concrete track to farm, continue past farm to the end of the track to park, although probably not advisable in very wet weather (SJ 785 673).

Habitat summary: Small, heavily shaded, easily inundated mid-channel bar, composed of pebbles and sand. It would be easier to access from the other side, given the steepness of the bank on this side. Bar unlikely to be trampled.

Habitat quality: **Medium**

*Woodhouse Farm 2 (6/2/05) D4*



Grid reference: SJ 78700 67506

Landowner: Mr WV Ford, Bellfields Farm, Congleton Road, Holmes Chapel, Crewe.  
(Father in law to the owner of Woodhouse farm, landowner)

Access: A535 out of Holmes Chapel, turn right along concrete track to farm, continue past farm to the end of the track to park, although probably not advisable in very wet weather (SJ 785 673).

Habitat summary: Medium sized, heavily shaded complex habitat dominated by sand, with some silt. Trampling most probably by sheep, although they are not on, likely to become heavily damaged.

Habitat quality: **Low**

*Woodhouse Farm 3(6/2/05) D5*





Grid reference: SJ 78660 67652

Landowner: Mr WV Ford, Bellfields Farm, Congleton Road, Holmes Chapel, Crewe.  
(Father in law to the owner of Woodhouse farm, landowner)

Access: A535 out of Holmes Chapel, turn right along concrete track to farm, continue past farm to the end of the track to park, although probably not advisable in very wet weather (SJ 785 673).

Habitat summary: Long thin, quite heavily shaded, fairly easily inundated ERS complex, dominated by sand with some cobbles and pebbles. Likely to be quite heavily grazed by sheep, although the size of the bar, especially towards the downstream end (top photo) would make it surveyable.

Habitat quality: **Medium**

*Saltersford Farm 1 (7/2/05) D6*





Grid reference: SJ 77711 67635

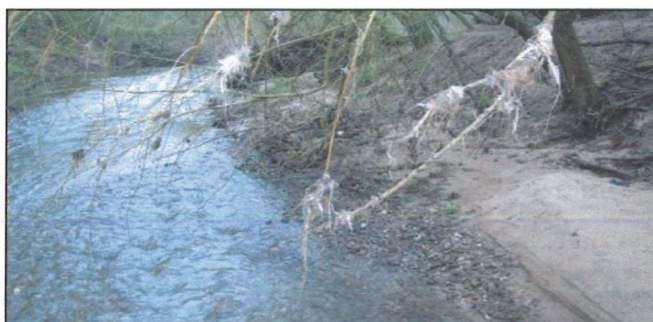
Landowner: John & Val Basford, Saltersford Farm, CW4 8AN

Access: A535 out of Holmes Chapel for 1km, layby on the right nearly opposite farm (SJ 777 678).

Habitat summary: Large bar complex of two bars (~5m between). The upstream bar (top picture) is a quite shaded, pebble dominated quite elevated section. The downstream bar (bottom picture) is a lightly shaded, steep, pure fine sand bar, which will vegetate over to some extent. The bars are fenced from cattle grazing, and should have no public access, although dogs had evidently been on the bar. A definitely surveyable bar complex, with only shading as a problem.

Habitat quality: **High**

*Saltersford Farm 2 (7/2/05) D7*





Grid reference: SJ 77960 67532

Landowner: John & Val Basford, Saltersford Farm, CW4 8AN

Access: A535 from Holmes Chapel 1km, layby on right ~opposite farm (SJ 777 678).

Habitat summary: Very long, heavily shaded, predominantly sandy bar complex, with some areas of silt and gravel (area of gravel could increase substantially if the water level drops). Half of the bar may vegetate over in summer, but large areas will remain open. Bar fenced off from cattle, no official public access, but dogs evidently on the bar on some occasions. Definitely surveyable, but Saltersford Farm 1 a much better bar.

Habitat quality: **Medium**

*Saltersford Hall 1 (6/2/05) D8*



Grid reference: SJ 77414 67731

Landowner: Mr Read, Saltersford Hall Farm, CW4 8AL.

Access: A535 out of Holmes Chapel, turn right along concrete track to farm, park in farmyard (SJ 773 675).

Habitat summary: A nice little, fairly easily inundated, un-shaded bar composed of cobbles and sand. Sheep are able to access the bar, but its coarse nature should protect

it from grazing damage to some extent. The size of the cobbles on this bar were unusually large for this stretch of river.

Habitat quality: **Medium**

*Saltersford Hall 2 (6/2/05) D9*



Grid reference: SJ 7831 6761 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Heavily shaded medium sized bar dominated by pebbles, with sandy edges. Easy livestock access may cause heavy damage in the summer months, and this, together with the level of shading make it unsuitable for survey.

Habitat quality: **Medium**

*Saltersford Hall 3 (6/2/05) D10*



Grid reference: SJ 781 675 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Partly shaded, small mid-channel bar, with a nice mix of small pebbles, gravel and sand. The area is fenced off from cattle and well away from



human interference. It is definitely surveyable, but probably does not warrant it given its small size and amount of shading.

Habitat quality: **Medium**

*Saltersford Hall 4 (6/2/05) D11*



Grid reference: SJ 7806 6749

Landowner: Mr Read, Saltersford Hall Farm, CW4 8AL.

Access: Easiest from Woodhouse Farm. A535 out of Holmes Chapel, turn right along concrete track to farm, continue past farm to the end of the track to park, although probably not advisable in very wet weather (SJ 785 673).

Habitat summary: Small, quite heavily vegetated, totally shaded, mid-channel bar composed of a nice mix of gravel and sand. No livestock access, but it also might be difficult for the surveyor to access due to deep water. Its small size, and total shade make it a low survey priority.

Habitat quality: **Medium**

*Holmes Chapel 1 (6/2/05) D12*



Grid reference: SJ 76311 67756

Landowner: ?

Access: Footpath. Take the A50 out of Holmes Chapel and park in 5-a-side football car park ~100m after bridge on left. Although may be better to access via Hollins Farm (SJ 763 684)?

Habitat summary:

Most of this bar was underwater at the time of survey, but more of the bar would be uncovered at lower water levels. An evidently easily inundated, partly shaded bar with a mixture of fine to coarse sands with some silt. Already heavily disturbed by people, likely to be very heavily trampled once the cattle are released on site. Not suitable for survey.

Habitat quality: **Low**

*Holmes chapel 2 (6/2/05) D13*



Grid reference: SJ 7658 6785 (opposite bank)

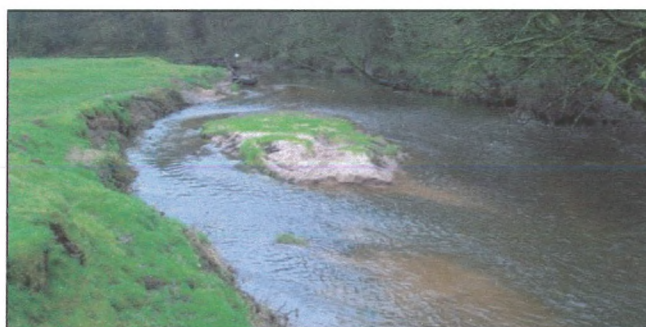
Landowner: ?

Access: ?

Habitat summary: Medium sized, narrow, open, predominantly sand bar, with some gravel. Likely to be very heavily trampled by livestock in summer and although there is no official access to public it is very easily visible and over-looked by a bridge, so chances of vandalism are high.

Habitat quality: **Medium**

*Holmes Chapel 3 (6/2/05) D14*



Grid reference: SJ 76993 67767

Landowner: ? John & Val Basford, Saltersford Farm, CW4 8AN ?

Access: Footpath. Take the A50 out of Holmes Chapel and park in 5-a-side football car park ~100m after bridge on left. Although may be better to access via Hollins Farm (SJ 763 684)?

Habitat summary:

Partly shaded, quite easily inundated, complex, heterogeneous, mid-channel bar complex, composed of fine pebbles, gravel and sand, which is likely to become much larger at lower water levels. Nice habitat, but is likely to be quite heavily damaged by walkers and cattle in the summer, which makes surveying it difficult.

Habitat quality: **Medium**

*Holmes Chapel 4 (6/2/05) D15*



Grid reference: SJ 7717 6795 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Large, heavily vegetated, partly shaded, complex sand bar, with a few small areas of pebbles. There is no public access to this site, and the bar will be protected from livestock damage to some degree by the willow vegetation and the bars' large size. Additional coarse rubble, which could act as an alternative habitat, can be found on the opposite bank. Surveyable, and good example of a large, almost purely sand bar.

Habitat quality: **Medium**

*Cotton Farm 1 (7/2/05) D16*

Grid reference: SJ 74072 67792

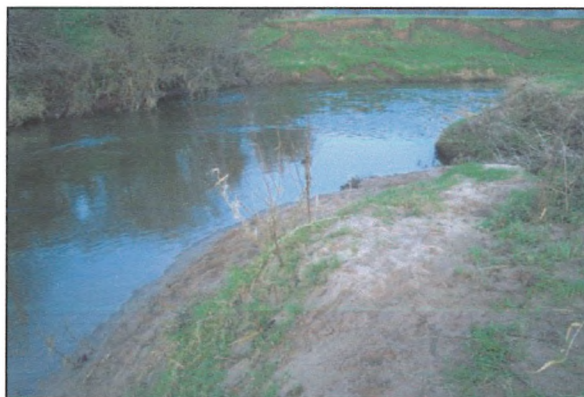
Landowner: Mr Newsham, Cotton Farm, CW4 7ET.

Access: B5308 out of Holmes Chapel for ~0.5km, turn right into Cotton Farm just before the road crosses the M6. Get key from Mr Newsham, then drive down the track past Cotton Hall right down to the river (SJ 743 677).

Habitat summary: Quite large, narrow, partly shaded, quite vegetated sand bar with small areas of gravel and fine pebbles. Is likely to get heavily trampled by cattle, and people, since this bar acts as a fishing peg. Probably not worth surveying.

Habitat quality: **Low**

*Cotton Farm 2 (7/2/05) D17*



Grid reference: SJ 73775 67763

Landowner: Mr Newsham, Cotton Farm, CW4 7ET.

Access: B5308 out of Holmes Chapel for ~0.5km, turn right into Cotton Farm just before the road crosses the M6. Get key from Mr Newsham, then drive down the track past Cotton Hall right down to the river (SJ 743 677).

Habitat summary:

A medium sized, partly shaded, partly vegetated, sand bar, with some small areas of small pebbles. Cattle and anglers might cause significant levels of disturbance.

Surveyable, but disturbance limits quality, however, likely to be better than the other Cotton Farm site.

Habitat quality: **Medium**

*Daisybank 1 (7/2/05) D18*



Grid reference: SJ 7212 6767 (opposite bank)

Landowner: JW Gleave, Daisybank Farm. CW4 7LP.

Access: A54 out of Middlewich for ~1.5km, turn left into farm yard (SJ 726 670)

Habitat summary: Medium sized, partly shaded, heavily vegetated sand bar. Edge of a large, overgrown point bar, which is fenced off. Not a high survey priority.

Habitat quality: **Low**

*Daisybank 2 (7/2/05) D19*

Grid reference: SJ 72091 67509

Landowner: JW Gleave, Daisybank Farm. CW4 7LP.

Access: A54 out of Middlewich for ~1.5km, turn left into farm yard (SJ 726 670)

Habitat summary: Quite large, unshaded, partly vegetated point bar, largely composed of fine sand, with a small area of fine pebbles becoming exposed at lower water levels. Already quite heavily impacted by sheep, cattle may have access later on, which both limit the survey suitability.

Habitat quality: **Medium**

*Daisybank 3 (7/2/05) D20*

Grid reference: SJ 72317 67550

Landowner: JW Gleave, Daisybank Farm. CW4 7LP.

Access: A54 out of Middlewich for ~1.5km, turn left into farm yard (SJ 726 670)

Habitat summary: Largely unvegetated, unshaded medium sized point bar. Already it is very heavily grazed by sheep and not suitable for survey.

Habitat quality: **Low**

*Daisybank 4 (7/2/05) D21*



Grid reference: SJ 7261 6735 (opposite bank)

Landowner: JW Gleave, Daisybank Farm. CW4 7LP.

Access: A54 out of Middlewich for ~1.5km, turn left into farm yard (SJ 726 670)

Habitat summary:

Interesting small, low-lying bar composed of sand and gravel. However it is likely to become very heavily trampled in summer.

Habitat quality: **Low**

*Daisybank 5 (7/2/05) D22*



Grid reference: SJ 72645 67639

Landowner: JW Gleave, Daisybank Farm. CW4 7LP.

Access: A54 out of Middlewich for ~1.5km, turn left into farm yard (SJ 726 670)

Habitat summary: Large, low-lying, partly vegetated, diverse bar, mainly composed of sand, but with areas of pebbles, gravel and silt. Livestock not on at present, but could cause quite a bit of damage when let on. Surveyable, but best at times when livestock not present. Fencing could move this area of habitat into the high quality bracket, but might lead to eventual succession.

Habitat quality: **Medium**

*Byley Hill 1 (7/2/05) D23*



Grid reference: SJ 7096 6757 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Large ERS complex made up of a point bar and mid-channel bar. Un-shaded, un-vegetated bar dominated by sand, but with large areas of fine pebbles, and gravel. Pebbles are an unusual feature for this far down the river. Evidently already quite heavily trampled by sheep, but with the island section included there is still quite an area of un-trampled habitat. This bar complex is worth sampling, especially if it can be fenced off.

Habitat quality: **High**



*Byley Hill 2 (7/2/05) D24*

Grid reference: SJ 70946 67444

Landowner: AL Moore and Partners, Byley Hill Farm. CW10 9OL.

Access: B5081 out of Middlewich, turn right after bridge and into layby, access through gate on the other side of the road.

Habitat summary: Small bar complex made up of three small mid-channel bars. Fairly easily inundated, mainly open, mainly un-shaded, diverse habitat mainly composed of gravel, but with areas of cobble, pebble and sand. The bar is fenced so should not be trampled, and is not open to the public, although there is angling access. A good bar to survey of comparable quality with Byley Hill 1 (although the latter would be of better quality if not grazed owing to its greater size and elevation).

- Also nearby mid-channel bar, inaccessible due to deep water (SJ 7085 6733)

Habitat quality: **High**

*Byley Hill 3 (7/2/05) D25 (no photograph, too dark)*

Grid reference: SJ 7078 6738 (opposite bank)

Landowner: AL Moore and Partners, Byley Hill Farm. CW10 9OL.

Access: B5081 out of Middlewich, turn right after bridge and into layby, access through gate on the other side of the road.

Habitat summary: Quite easily inundated, un-shaded, un-vegetated, narrow mid-channel bar of medium length dominated by pebbles, but with significant areas of

gravel and sand. Not fenced, but steep bank might protect it from livestock access.

Quite a nice, small, but surveyable bar

Habitat quality: **Medium**

*Shipbrook Hill (5/2/05) D26*



Grid reference: GPS in error SJ 673 741

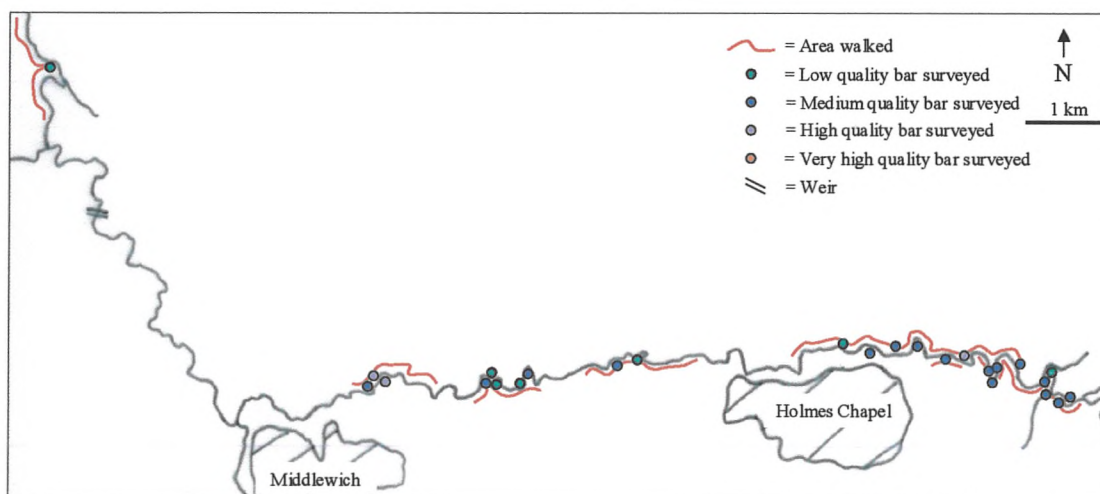
Landowner: Mr and Mrs Bennett, Shipbrook Hill Farm, Whatcroft. CW9 7RH

Access: B5309 from Middlewich, turn left after ~5km, parking over bridge in layby (SJ 671 712).

Habitat summary: Small, un-vegetated, completely shaded fine sand bar. Fishing peg, will be highly disturbed by summer, if not, it will vegetate over.

Habitat quality: **Low**

### 3.1.2 Survey Distribution and ERS Quality Map



### 3.2 The River Weaver

#### 3.2.1 Surveys

##### *Moss Hall 1 (4/2/05) W1*



Grid reference: GPS in error SJ 651 439

Landowner: Moss Hall.

Access: Enter Audlem on A425 from Woore, turn right at church then a quick left after the PH, park in farm yard (SJ 655 441)

Habitat summary: Reasonable sized, elevated pure sand bar. Heavily trampled by sheep, and very low diversity.

Habitat quality: **Low**

##### *Moss Hall 2 (4/2/05) W2*



Grid reference: SJ 65293 43583

Landowner: Moss Hall.

Access: Enter Audlem on A425 from Woore, turn right at church then a quick left after the PH, park in farm yard (SJ 655 441)

Habitat summary: Small shaded area of open sand around tree and highly vegetated area on opposite bank. Also likely to be heavily trampled by sheep later in the year.

Habitat quality: **Low**

*Coole Hall 1 (4/2/05) W3*



Grid reference: SJ 65966 45654

Landowner: Mr Goodwin, Coole Hall Farm, Hankelow, Crewe. CW3 0JD

Access: Exit Audlem on A525 towards Whitchurch, turn right ~1km after bridge, after ~3km turn right down the track to Coole Hall Fm, park in farmyard.

Habitat summary: Shaded, quite vegetated small area of quite diverse fine sediments, ranging from medium sand to silt. Open eroding banks on the other side. Fenced off from grazing

Habitat quality: **Low\*** (but of better quality than most of the low quality bars on this river)

*Coole Hall 2 (4/2/05) W4*

Grid reference: SJ 66042 45820

Landowner: Mr Goodwin, Coole Hall Farm, Hankelow, Crewe. CW3 0JD

Access: Exit Audlem on A525 towards Whitchurch, turn right ~1km after bridge, after ~3km turn right down the track to Coole Hall Fm, park in farmyard.

Habitat summary: Shaded, quite open, small elevated area of mixed fine sediments, ranging from medium sands to silt. Small, dirty pool at the back of the bar. Protected from livestock damage by fencing. It will vegetate over to some extent, but some areas should remain open. In close proximity to small open grazed bar just upstream on the opposite bank.

Habitat quality: **Medium**

*Brinepits (4/2/05) W5*

Grid reference: SJ 65475 46621

Landowner: Brinepits Farm?

Access: ?

Habitat summary: Very small area of quite heavily vegetated medium clean sand. Open to sheep trampling later in the year, this may be responsible for keeping the sediments open.

Habitat quality: **Low**

*Dairy House 1 (4/2/05) W6*



Grid reference: SJ 670 478 (opposite bank)

Landowner: Joe Williamson, Dairy Farm, Austerson, Nantwich. CW5 8AT

Access: Exit Audlem on A525 towards Whitchurch, turn right ~1km after bridge, after ~5km turn right down the track to Dairy House Fm, park in farmyard.

Habitat summary: Small open, shaded point bar composed of fine sand and silt. Open to livestock grazing, but steepness might protect it to some extent.

Habitat quality: **Low**

*Dairy House 2 (4/2/05) W7*



Grid reference: SJ 67004 47832

Landowner: Joe Williamson, Dairy Farm, Austerson, Nantwich. CW5 8AT

Access: Exit Audlem on A525 towards Whitchurch, turn right ~1km after bridge, after ~5km turn right down the track to Dairy House Fm, park in farmyard.

Habitat summary: Reasonably large (for the Weaver), heavily shaded, quite heavily vegetated sand bar with a silty toe. Fenced off from livestock.

Habitat quality: **Low**

*Dairy House 3 (4/2/05) W8*



Grid reference: GPS in error SJ 667 474 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Shaded, quite heavily vegetated very small area of fine sand and silt. Possibly trampled.

Habitat quality: **Low**

*Dairy House 4 (4/2/05) W9*



Grid reference: GPS in error SJ 666 473

Landowner: Joe Williamson, Dairy Farm, Austerson, Nantwich. CW5 8AT

Access: Exit Audlem on A525 towards Whitchurch, turn right ~1km after bridge, after ~5km turn right down the track to Dairy House Fm, park in farmyard.

Habitat summary: Heavily shaded, heavily vegetated medium sized (for the Weaver) area of fine sand. Likely to be heavily trampled later in the year.

Habitat quality: **Low**

*Batherton Hall 1 (5/2/05) W10*



Grid reference: SJ 6609 4971

Landowner: Mr Smith, Batherton Hall Farm, Batherton, Nantwich. CW5 7QN.

Access: Exit Nantwich on A529 for ~1km, turn right to Batherton Hall, park in farmyard. Millennium woodland demarcates riverside land.

Habitat summary: Steep, heavily shaded, partly vegetated area of clean fine sand. Fenced both sides.

Habitat quality: **Low**

*Batherton Hall 2 (5/2/05) W11*





Grid reference: SJ 66094 49712

Landowner: Mr Smith, Batherton Hall Farm, Batherton, Nantwich. CW5 7QN.

Access: Exit Nantwich on A529 for ~1km, turn right to Batherton Hall, park in farmyard. Millennium woodland demarcates riverside land.

Habitat summary: Large area (for the Weaver) of shaded, heavily vegetated sand with a silty toe. It is fenced, and likely to get heavily vegetated in the summer, although some areas will probably remain open. Also it is close to other similar bars.

Habitat quality: **Low\*** (but of better quality than most of the low quality bars on this river)

*Batherton Hall 3 (5/2/05) W12*



Grid reference: SJ 66074 49608

Landowner: Mr Smith, Batherton Hall Farm, Batherton, Nantwich. CW5 7QN.

Access: Exit Nantwich on A529 for ~1km, turn right to Batherton Hall, park in farmyard. Millennium woodland demarcates riverside land.

Habitat summary: Heavily shaded, partly vegetated, fine sand bar with some silty areas. Fenced both sides, eroding bank on the other side.

Habitat quality: **Low**

*Batherton Hall 4 (5/2/05) W13*



Grid reference: SJ 65720 49981

Landowner: Mr Smith, Batherton Hall Farm, Batherton, Nantwich. CW5 7QN.

Access: Exit Nantwich on A529 for ~1km, turn right to Batherton Hall, park in farmyard. Millennium woodland demarcates riverside land.

Habitat summary: Virtually unshaded, although quite highly vegetated, clean sand bar with silty areas. It will be untrampled, and has good quality, loose eroding banks for some distance on both sides. This is a very nice piece of habitat in the context of the rest of the river and adjoins nice wet-woodland habitat with a pond.

Habitat quality: **Medium**

*Mile End 1 (5/2/05) W14*



Grid reference: SJ 65484 54216

Landowner: Mrs Need, Mile End Farm. CWS 6DN.

Access: B5074 out of Nantwich for ~1.5km, turn right into drive park away from the trucks (SJ 655 547)

Habitat summary: Barely vegetated, un-shaded, clean fine sand bar. Likely to become heavily trampled in the summer.

Habitat quality: **Low**

*Mile End 2 (5/2/05) W15*



Grid reference: SJ 65703 54312

Landowner: Mrs Need, Mile End Farm. CWS 6DN.

Access: B5074 out of Nantwich for ~1.5km, turn right into drive park away from the trucks (SJ 655 547)

Habitat summary:

Long, thin, un-shaded, lightly vegetated, pure sand bar with some silty areas. Likely to be heavily trampled in the summer.

Habitat quality: **Medium**

*Mile End 3 (5/2/05) W16*



Grid reference: SJ 6570 5437 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Quite large (for the Weaver), relatively lightly vegetated and relatively un-shaded point bar composed of sand and silt. Has a 60-70m area of shaded sandy sediments in a thin strip downstream, and a muddy pool in its centre. Sewage works may provide alternative, coarser habitat nearby. Ungrazed, evidently surveyable.

Habitat quality: **Medium**

*Mile End 4 (5/2/05) W17*





**Grid reference:** SJ 65797 54307

**Landowner:** Mrs Need, Mile End Farm. CWS 6DN.

**Access:** B5074 out of Nantwich for ~1.5km, turn right into drive park away from the trucks (SJ 655 547)

**Habitat summary:** A very long complex area of sediment composing sections of eroding bank and smaller wider areas of open sediment. Lightly vegetated, lightly shaded, clean sand bar with some areas of silt. Likely to get heavily trampled, but some areas are likely to remain un-impacted, so still surveyable.

**Habitat quality: Medium**

*Mile End 5 (5/2/05) W18*



**Grid reference:** SJ 66283 54719

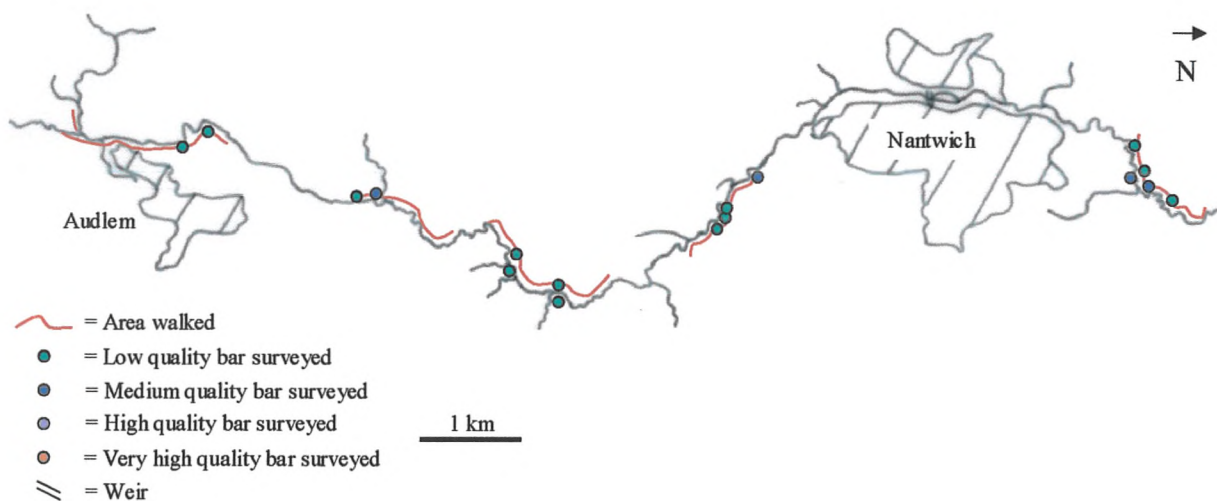
**Landowner:** Mrs Need, Mile End Farm. CWS 6DN.

**Access:** B5074 out of Nantwich for ~1.5km, turn right into drive park away from the trucks (SJ 655 547)

**Habitat summary:** Reasonably large (in the context of the River Weaver), un-shaded, lightly vegetated fine sand bar, with some areas of silt. Golf course on opposite bank may provide alternative sandy habitat. Likely to be heavily grazed in the summer.

**Habitat quality:** Low

### 3.2.2 Survey Distribution and ERS Quality Map



## 3.3 The River Bollin

### 3.3.1 Surveys

#### *Sewage Works 1 (8/2/05) B1*





Grid reference: SJ 89167 78962

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Shaded, lightly vegetated section of very diverse ERS braided complex composed of 6 smallish patches of ERS. Sediments range all the way from cobbles, pebbles, gravel and sand, and include a significant area of each. Not fenced, most probably grazed by sheep, but area is large enough, coarse enough, and difficult to access enough, that grazing damage should be light.

Habitat quality: **High**

*Sewage Works 2 (8/2/05) B2*



Grid reference: SJ 8929 7887 (opposite bank)

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Excellent large point bar, with a low level of vegetation cover and shading, and very high sediment diversity, opposite a high quality, eroding bank. Sediments are dominated by sand, but range from cobbles, through pebbles, and gravels, to sand, with significant amounts of each. Access to livestock from other side, should not do huge amount of damage, but if they do this should be fenced. Very high invertebrate survey priority.

Habitat quality: **Very High**

*Sewage Works 3 (8/2/05) B3*



Grid reference: SJ 89254 78805

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Quite large high quality complex point bar with little shading and vegetation cover, next to a 10m high loose eroding sand bank. Bar composed of a relatively even mix of cobbles, pebbles, gravel, and sand. Fenced on this side, but livestock access from the other. Access to livestock from other side, should not do huge amount of damage, but if they do this should be fenced. Very high invertebrate survey priority.

Habitat quality: **Very high**

*Sewage Works 4 (8/2/05) B4*







**Grid reference:** SJ 89264 78628

**Landowner:** ?

**Access:** Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

**Habitat summary:** An old braided meander that has cut through to create a new braided channel to leave a huge, very complex area of multiple ERS patches (~12) covering ~100m<sup>2</sup> area. There are large areas of cobble, pebble, gravel, sand and silt situated right next to an ~12m high, eroding sand bank. There is quite a lot of human disturbance and livestock have access from the other side. The area is so diverse and

large that it will be resistant to a lot of this damage, but if it gets severe this area should be fenced. There is a mix of shaded and open, and lightly vegetated and un-vegetated habitats. This site is of very high invertebrate survey priority, but would require a large amount of survey effort to sample completely.

Habitat quality: **Very high**

*Sewage Works 5 (8/2/05) B5*



Grid reference: SJ 89738 77894

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: A sizeable, barely vegetated, lightly shaded, sandy point bar, with a very cobbly bar just downstream on the opposite bank. The bar is composed of a relatively even mixture of gravel, coarse sand, and fine sand. There is no access to livestock, but the bar is quite trampled by people and dogs, which may make surveys difficult.

Habitat quality: **High**

*Golf course 1 (8/2/05) B6*



Grid reference: SJ 88772 79728

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Medium sized, coarse, heavily shaded, open mid-channel bar, dominated by pebbles, but with cobbles and sand. Livestock access from the other side, but unlikely to be highly impacted. This is typical of many bars for which visual surveys were not undertaken in this reach.

Habitat quality: **High**

*Golf Course 2 (8/2/05) B7*



Grid reference: SJ 88651 79738

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Quite large lateral bar, with limited shading and vegetation cover with an area of slack water at the back. Composed of a mix of cobbles, pebbles, gravel and sand, but dominated by pebbles and gravel. Livestock access only from the other side, but unlikely to be heavy. A very nice bar that like many bars in this stretch would be likely to produce good invertebrate survey results.

Habitat quality: **Very high**

*Golf course 3 (8/2/05) B8*

Grid reference: SJ 88510 79787

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Might be better to go into Prestbury though.

Habitat summary: Medium sized, heavily shaded, un-vegetated, island bar, mainly composed of cobbles and pebbles but with small areas of gravel and sand. No livestock access from this side, and bar is coarse enough to resist trampling damage from livestock crossing the river.

Habitat quality: **High**

*Golf Course 4 (8/2/05) B9*

Grid reference: SJ 88201 80347

Landowner: ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath.

Habitat summary: Quite large, unshaded, barely vegetated, diverse point bar, in close proximity to several nice smaller bars and nice eroding banks, dominated by pebbles, but with significant areas of cobble, gravel and sand. Only weakness is the lack of fencing on both sides, there could be significant trampling damage.

Habitat quality: **High**

*Newton Hall 1 (8/2/05) B10*



Grid reference: SJ 88013 80409

Landowner: Mrs Labella, Newton Hall Farm. SK10 4LJ

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Could probably park at Newton Hall farm (SJ 880 807).

Habitat summary: Quite large, high quality, un-shaded, un-vegetated, point bar in a large point bar complex, dominated by sand but with significant amounts of cobbles, pebbles and gravel. It is fenced on this side, but not on the opposite bank. However, the size of the bar and the low banks which make it easy for livestock to drink along the entire stretch will limit the amount of trampling damage. High invertebrate survey priority.

Habitat quality: **Very high**

*Newton Hall 2 (8/2/05) B11*



Grid reference: SJ 8803 8045 (opposite bank)

Landowner: Mrs Labella, Newton Hall Farm. SK10 4LJ

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Could probably park at Newton Hall farm (SJ 880 807).

Habitat summary: Quite large, virtually un-shaded, un-vegetated high-quality point bar, within a large high quality point bar complex, mainly composed of pebbles and sand, but with significant areas of gravel and cobbles. It is only partly fenced, however, the size of the bar and the low banks which make it easy for livestock to drink along the entire stretch will limit the amount of trampling damage. High invertebrate survey priority.

Habitat quality: **Very high**

*Newton Hall 3 (8/2/05) B12*



Grid reference: Did not take, just down stream from Newton Hall 2

Landowner: Mrs Labella, Newton Hall Farm. SK10 4LJ

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Could probably park at Newton Hall farm (SJ 880 807).

Habitat summary: Another high quality, large, un-shaded, un-vegetated point bar, dominated by gravel but with significant areas of cobbles, pebbles, and sand. It is not fenced, but the size of the bar, and the easy access to water by livestock should limit the amount of trampling damage. There is also an almost identical bar downstream on the other side, which I did not survey. Both are high invertebrate survey priorities.

Habitat quality: **Very High**

*Newton Hall 4 (8/2/05) B13*



Grid reference: SJ 87698 80490

Landowner: Mrs Labella, Newton Hall Farm. SK10 4LJ

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Could probably park at Newton Hall farm (SJ 880 807).

Habitat summary: Very large, un-shaded, un-vegetated, high quality point bar in a high quality point bar complex, composed of a reasonably even mix of cobbles, pebbles, gravel and sand. The bar is open to livestock on both sides but trampling damage is likely to be light. Very high invertebrate survey priority.

Habitat quality: **Very high**

*Newton Hall 5 (8/2/05) B14*





Grid reference: SJ 8658 8094 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: Quite a long, lightly shaded, lightly vegetated bar, dominated by sand, with a significant area of gravel. The bar is unfenced, but livestock access is not easy from either bank. It is of a quite different, finer character than the bars in the upstream reach.

Habitat quality: **High**

*Newton Hall 6 (8/2/05) B15*



Grid reference: SJ 8646 8097 (opposite bank)

Landowner: ?

Access: ?

Habitat summary: A small, complex, lightly shaded, open bar mainly composed of sand and gravel, with a significant amount of pebbles. This bar is unfenced and, given its small size and fine nature, could be heavily damaged by grazing

Habitat quality: **High**



*Newton Hall 7 (8/2/05) B16*

Grid reference: SJ 86365 80973

Landowner: ? Mrs Labella, Newton Hall Farm. SK10 4LJ ?

Access: Footpath. Difficult to get close to site by car. Take A538 out of Macclesfield for ~3km, turn left onto B 5358 for ~2km, park in layby next to 'Top o'hill Farm', walk down footpath. Could probably park at Newton Hall farm (SJ 880 807).

Habitat summary: A medium sized, un-shaded, virtually un-vegetated bar dominated by sand, with areas of gravel and silt. An interesting feature of the bar is the small stream at its downstream end, which has deposited quite a large area of silt on the bar. This bar is however open to grazing and on a footpath close to Wilmslow, and has already suffered quite severe trampling damage so is probably unsuitable for survey.

Habitat quality: **Medium**

*The Carrs 1 (9/2/05) B17*

Grid reference: GPS reading in error, SJ 840 821

Landowner: ?

Access: Take the B5166 from Wilmslow turn left just before the bridge. Public access, park at picnic area (SJ 839 822).

Habitat summary: A small, easily inundated, bare, lightly shaded, mid-channel bar composed of gravel and sand. The bar has been heavily impacted by the public, and would be impossible to pitfall due to the high level of public disturbance.

Habitat quality: **Low**

*The Carrs 2 (9/2/05) B18*



Grid reference: GPS reading in error, SJ 841 817

Landowner: ?

Access: Take the B5166 from Wilmslow turn left just before the bridge. Public access, park at picnic area (SJ 839 822).

Habitat summary: A small, very lightly shaded, virtually un-vegetated mid-channel bar complex composed of sand and gravel. The high level of public disturbance and trampling make it impossible to sample using pitfalls, but this is still quite a nice area of habitat which would be likely to contain many of the small ERS specialist staphylinids if the level of trampling is not too high. The area has large areas of loose eroding banks in close proximity, and many more smaller, mid-channel bars of similar quality.

Habitat quality: **Medium**

*Styal Country Park (9/2/05) B19*



Grid reference: GPS reading in error, SJ 828 831

Landowner: National Trust, Steve Sparks (head warden) 01625 415199

Access: B 5166 out of Wilmslow for ~2km, turn left into the Quarry Bank Mill NT site, take the kingfisher walk path.

Habitat summary: Very low quality, completely shaded, highly vegetated point bar, composed of sand and gravel, with no livestock access. Despite its very poor quality, this bar is likely to be the best in this ~4km stretch of NT land.

Habitat quality: **Low**

*Ashley Heath 1 (3/2/05) B20*



Grid reference: SJ 7664 8583 (opposite bank, mainly)

Landowner: Abbey Mill

Access: A538 from Wilmslow for ~4km, turn left after the tunnel, carry on for 5km on this road, always bearing right. Turn left before bridge and park where the dog walkers park.

Habitat summary: Long, thin, heavily shaded, partly vegetated bar complex, dominated by sand with some gravel and pebbles. The main section of the bar is at the end of a garden, so may be suitable to sample, depending on whether the owners have dogs and/or children or not. The small area of gravel and sand is open to the public and easily inundated, so is only suitable for hand searches. On the near bank there is a complex eroding bank mainly composed of silt, underlain by clay.

Habitat quality: **Medium**

*Ashley Heath 2 (3/2/05) B21*



Grid reference: SJ 76424 85806

Landowner: ?

Access: A538 from Wilmslow for ~4km, turn left after the tunnel, carry on for 5km on this road, always bearing right. Turn left before bridge and park where the dog walkers park.

Habitat summary: Small, heavily shaded, lightly vegetated complex of fine sand. Heavily disturbed by dogs and people.

Habitat quality: **Low**

*Ashley Heath 3 (3/2/05) B22*



Grid reference: SJ 7633 8583 (opposite bank)

Landowner: ?

Access: A538 from Wilmslow for ~4km, turn left after the tunnel, carry on for 5km on this road, always bearing right. Turn left before bridge and park where the dog walkers park.

Habitat summary: Small, heavily shaded, partly vegetated, sand bar, with a small amount of gravel and pebbles. Open to the public on opposite bank, livestock may access on the bar side.

Habitat quality: **Low**

*Ashley Heath 4 (3/2/05) B23*



Grid reference: SJ 76337 85630

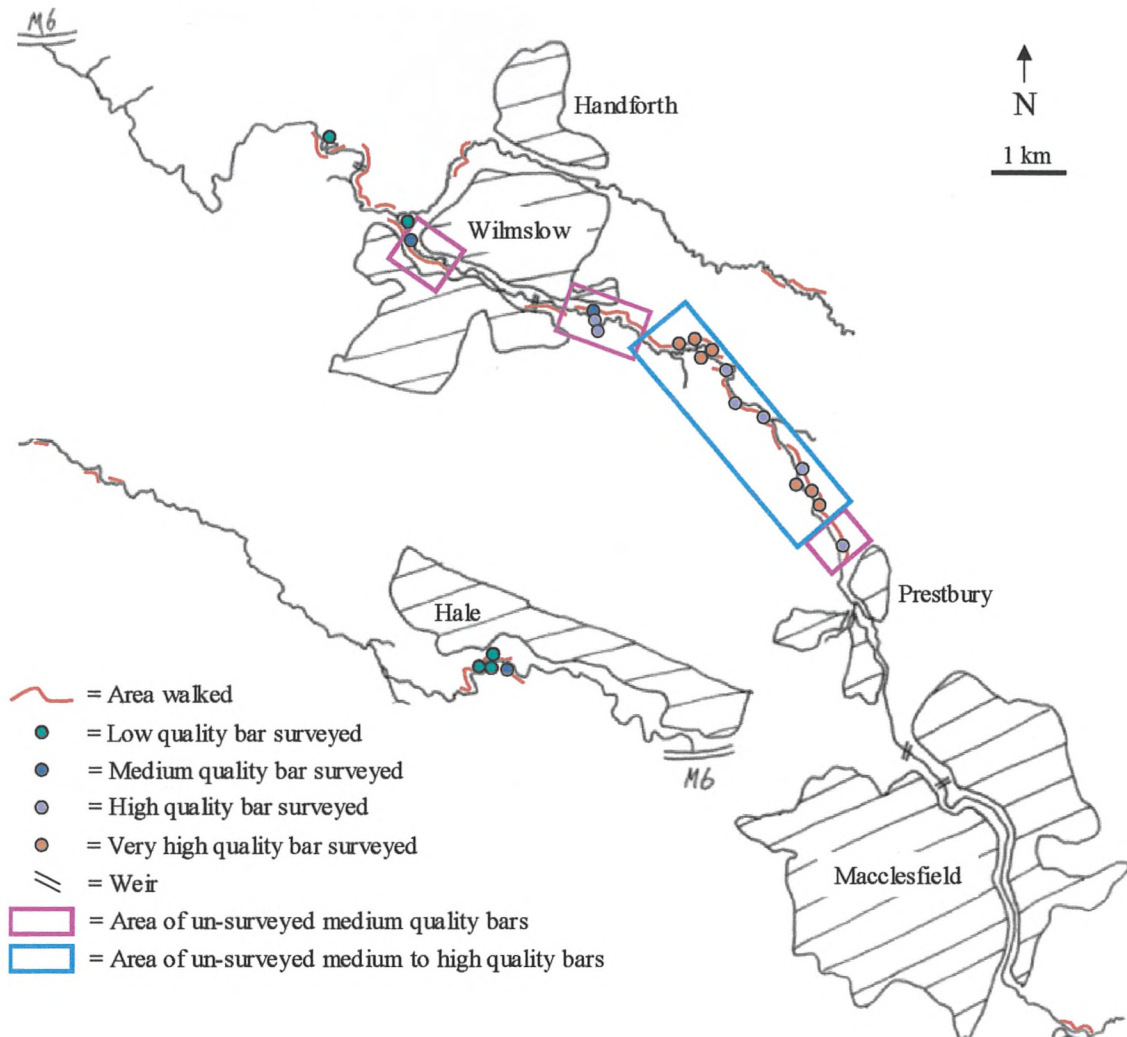
Landowner: ?

Access: A538 from Wilmslow for ~4km, turn left after the tunnel, carry on for 5km on this road, always bearing right. Turn left before bridge and park where the dog walkers park.

Habitat summary: Small, easily inundated, heavily shaded, open mid-channel sand bar composed of an even mix of sand and gravel. It looks like children play here a lot, so it is unsuitable for survey.

Habitat quality: **Low**

### 3.3.2 Survey Distribution and ERS Quality Map



## 4. DISCUSSION

### 4.1 The River Dane

Bell and Sadler (2003) surveyed six sites on the River Dane and found that two sites could be ranked in the top ten of surveyed ERS sites across England and Wales. This finding was highly significant, and perhaps surprising when the size and amount of sediment in the Dane is considered. It was the significance of the ERS beetle fauna found in that survey which partly stimulated the need for this current survey. The report speculated that sites downstream of the area surveyed might contain higher quality ERS, because further downstream it was assumed that there might be a greater range of sediment types. However, whilst it is not possible to completely tell the quality of the invertebrate fauna from a visual survey, it seems

unlikely that the ERS visually surveyed in this report are of as good a quality as the sites already surveyed by Bell and Sadler (2003). The reasons for this apparent reduction in ERS quality downstream of the confluence with the Swettenham Brook seem to be two-fold. Firstly, the river just downstream of the confluence is constrained on one side or the other (sometimes both) by very steep, relatively erosion resistant river terraces and valley sides, which reduce the tendency for the river to migrate laterally. Secondly, the amount of riverine sediments coarser than sand becomes low quite rapidly after this point. Such broad-scale downstream fining of sediments is characteristic for most rivers (e.g. Ferguson and Ashworth 1991; Petts *et al.* 2000). When undisturbed, purely sand sediments tend to vegetate over quite rapidly, so the chance of finding reasonably sized bar-forms becomes markedly reduced. When subject to disturbances frequent enough to prevent vegetation succession, sands are very highly mobile and can sometimes be too disturbed for some species. Additionally, finer sediments are less resistant to trampling damage, a characteristic that co-varies with the level of exposure to livestock trampling; more livestock are typically found further downstream in the study catchments. However, coarser sediment can be injected into rivers further downstream by tributaries, or by erosion (Rice *et al.* 2001), and this probably explains the sudden re-coarsening of sediments just north of Middlewich. Eroding banks containing significant amounts of gravel (e.g. photograph (c) below) were rare, most were eroding sandbanks (e.g. photograph (a)) with the occasional old gravel channel fill (e.g. photograph (b)). This limited the amount of coarse sediments injected into the river further downstream and contributed towards a certain level of bank stability, as gravel sediments underlying more cohesive sands are known to erode rapidly (Lawler *et al.* 1997; Brewer and Lewin 1998).





The laterally constrained section of river started a few hundred metres downstream of the confluence with the Swettenham brook, and continued for 1-2km (SJ 788 672 – SJ 755 677). This section did contain quite a number of bars of variable character, but the small size, or level of shading meant that most were only of medium quality. The one exception was D6, which just about got into the high quality bracket owing to a good mix of sediment types, and a relatively low level of shading. Below this constrained section, sediments were generally dominated by sand. Near to Holmes Chapel the quality of ERS was often limited by trampling due to public access. Livestock trampling was also likely to be a problem in many of the remaining sites surveyed downstream. Just north of Middlewich (SJ 71 67) there was a sudden coarsening of the sediment and consequent increase in the quality of ERS, with two bars in the high quality bracket (D23 D24). It is possible that there are further bars just downstream of this area, but I was unable to gain site access. Further down the river (e.g. D26) the river is over-deepened, with no trace of sediments coarser than sand, and is thus unlikely to contain any reasonable quality ERS.

#### **4.2 The River Weaver**

The River Weaver in contrast to the Dane and Bollin is a purely sand-bed river in the sections surveyed, and, given the low elevation of its source, probably throughout the rivers length. As mentioned above, when the flood regime does not provide enough disturbances to prevent succession, pure sand ERS tend to vegetate over very rapidly. The permeable nature of the geology probably means that most



water is input relatively slowly from groundwater sources and that therefore there are few floods capable of causing lateral erosion. Nonetheless, there remain several areas of loose eroding bank in this system (see example below), and, given the relative paucity of sand bars in this system, these eroding banks might provide the majority of the available ERS habitat. It is therefore recommended that any ERS invertebrate surveys should include surveys of nearby eroding banks.



ERS quality is generally low along the river, with most of the open sediments only remaining so due to either trampling, or heavy shading. Only five patches (W4, W13, W15, W16 and W17) were classified as of medium quality, and probably then only just. Of these, W15 and W17 are mainly sections of eroding bank and would be difficult to sample due to livestock interference. It is unlikely that there are any better quality sediments in other sections of the river; all additional areas of ERS are likely to be of similar quality to those surveyed. Most of the upper section surveyed was characterised by a large number of very old alders, many of which are now dying, these possibly represent important resources for saproxylic invertebrates, and contribute large amounts of large woody debris to the river, which collected as log jams in some areas. The section of river owned by Batherton Hall (W10-13) runs through a recently planted area of mixed woodland and marshy/pond land. This section thus provides the greatest potential to capture non-ERS specialist invertebrates of conservation importance and also has the best examples of loose, undisturbed eroding banks surveyed (see photo above).

#### **4.3 The River Bollin catchment**

A large (~6km) section of the River Bollin between Prestbury and Wilmslow contained many bars of high to very high quality. This section represented by far the

best ERS surveyed in this report, and is quite likely to be habitat for an ERS beetle fauna of greater conservation importance than that found on the Upper Dane. However, it must be appreciated that a visual survey is not an adequate substitute for a systematic invertebrate survey. This section represents an extremely high invertebrate survey priority, particularly given the relative lack of good quality ERS in the EA Northwest South region. Remarkably, it would seem that the river has largely escaped the attention of coleopterists. In the UK carabid database there are only a few records of ERS specialists from this 10km square (*Amara fulva*, *Bembidion atrocaeruleum*, *B. femoratum*, *B. punctulatum*, *Bracteon litorale* and *Clivina collaris*), and when the position of these records are further specified, they seem to originate from the downstream section of the River Dean, which is of poor quality in terms of its ERS. These few scattered records certainly do not represent any reasonable sampling effort. In addition to the quality of ERS bars in this reach, there are numerous examples of composite (gravel and sand) eroding banks (e.g. B2 and B7), and in two instances (see B3 and B4), more than 10m high eroding sandbanks. The former probably contribute to the high level of lateral instability, and therefore, high ERS quality, in the reach. The latter may also provide important habitat for rare Aculeate Hymenoptera (particularly solitary bees and wasps) and for nesting sand martins.

Upstream of Macclesfield the Bollin is too small to contain ERS, and within Macclesfield it is strongly channelised (M Crampton pers comm.) and contains two weirs. It is possible, but fairly unlikely, that the small section between Macclesfield and Prestbury contains good quality ERS, however, this was not examined as site access was difficult, and it looks like most of it has been straightened from the map. Just downstream of Prestbury the very high quality section of ERS river is situated. This was of such high quality that many medium quality bars, and some of high quality were not surveyed, particularly around the section of very tight meanders (~SJ 877 805). Two sections were of exceptional quality, both for the very high individual quality of their bars and eroding banks, and for the sheer amount of ERS patches in such close proximity to each other. These were (1) the section next to the sewage works (bounded by the 1km square SJ 89 78), and (2) the Newton Hall Farm section (~SJ 877 805). The only weakness of these sections is the relatively high level of public and livestock access, however, the huge amount of ERS in these sections should mean that some areas remain relatively undisturbed.

Once the river moves into Wilmslow the quality of the ERS starts to become compromised by two main factors: (1) by a >2m high weir, which causes water to pool up behind it, reducing the erosive capacity of the river for hundreds of metres and reducing the rate of sediment supply downstream; and (2) heavy levels of public disturbance. The weir looks like it has recently been heightened, further such measures are likely to seriously compromise the quality of ERS in this reach.

The River Dean was walked in two places, and although it is of a similar size to the Bollin, there is very little sediment within it. This delivery of water, without sediment, together with the very large negative effects of the ~6m high Quarry Bank Mill weir are probably the cause of the over-deepened, low quality nature of the rest of the river. Downstream of the Dean confluence there is little quality ERS, the best being a medium quality, long, but thin sand bar (B20) ~15km downstream of this point.

#### **4.4 Suggested ERS quality hierarchy of surveyed bars**

The three sections of river surveyed were of markedly different quality, with the Bollin of much greater quality than the Dane, and the Dane of much greater quality than the Weaver, so the quality hierarchy has been separated by river. Although the Bollin represents the highest quality habitat, the Weaver is of a markedly different character and so will contain a very different suite of invertebrates. The extra value in surveying parts of the Dane lies not in surveying the best sites (these have most probably already been surveyed), but in sampling sediments widely separated from those already surveyed. In so doing, answering questions such as: is *Meotica anglica* likely to be distributed throughout the river, or is it very localised? The quality hierarchies have been organised according to several different sampling scenarios: (1) very intensive; as many as ten sites surveyed; (2) intensive; five to six sites surveyed; (3) targeted; two to three sites surveyed; (4) exploratory; one site fully surveyed, or several sites hand searched. To use the example of beetles, intensive surveys are the typical ERS beetle surveys implemented by Dave Bell, Jon Sadler and Adam Bates (e.g. Sadler *et al.* 2004; Bates and Sadler 2004). They typically comprise one or more two-week pitfall (9-10 pitfall traps) samples, ~4, 20-minute timed hand searches (splashing at the water's edge, turning over stones, etc. and sucking up beetles with an aspirator), and ~4 excavation hand searches (digging a small hole near to the water's edge and collapsing in the sides so that small beetles that live under the ground will float to the surface of the water that has gathered in the bottom). More

extensive surveys could be composed of timed hand searches and excavation over several bars without pitfall trapping.

*The Bollin*

(1) This is the only one of the three rivers that has enough quality ERS to reasonably allow this level of survey effort. Survey sites are recommended in the following order:

Rank	Code	Grade	Additional reasons
1	B4	Very high	Huge diverse ERS complex, with the full range of microhabitats
2	B2	Very high	Excellent large point bar and high quality eroding bank
3	B13	Very high	Largest of the very high quality point bars in Newton Hall reach
4	B12	Very high	
5	B11	Very high	
6	B7	Very high	
7	B3	Very high	
8	B20	Medium	Far removed, and of markedly different character than other better ERS
9	B1	High	Small braided section of different character from the many very good point bars
10	B10	Very high	

(2) This is the only one of the three rivers where this sampling scenario is recommended:

Rank	Code	Grade	Additional reasons
1	B4	Very high	Huge diverse ERS complex, with the full range of microhabitats
2	B2	Very high	Excellent large point bar and high quality eroding bank
3	B13	Very high	Largest of the very high quality point bars in Newton Hall reach
4	B12	Very high	
5	B11	Very high	
6	B20	Medium	Far removed, and of markedly different character than other better ERS

(3) In my opinion, more sites should be surveyed than is specified in this scenario, but this is the minimum number of surveys required for ERS on this river.

Rank	Code	Grade	Additional reasons
1	B4	Very high	Huge diverse ERS complex, with the full range of microhabitats
2	B2	Very high	Excellent large point bar and high quality eroding bank
3	B13	Very high	Largest of the very high quality point bars in Newton Hall reach

(4) If only one site was to be intensively surveyed then it should be B4. However, a better option for this amount of survey effort would be to hand search and excavate (Bates and Sadler 2004) on bars B2-4, and on the very high quality point bars at Newton Hall farm (e.g. B13), together with hand searches of eroding banks.

*The Dane*

Because of the fairly intense survey of Bell and Sadler (2003) I do not suggest that scenarios (1) and (2) are necessary.

(3) This option would survey all the sites identified as belonging in the high quality category.

Rank	Code	Grade	Additional reasons
1	D23	High	Far removed from previous surveys, good mix of microhabitats, however grazing risk
2	D6	High	Partly shaded and close to previous study, but a safe bet in terms sample returns
3	D24	High	Small, easily inundated, and potentially grazed

(4) If one site was to be extensively sampled then it should be D23, particularly given the large distance between this site and the sites previously surveyed. This would be recommended over multiple hand searches over several bars.

*The Weaver*

Scenario (3) is possible, but not recommended given the significant possibility of obtaining very poor quality invertebrate returns. However, such very sandy slow moving rivers have very rarely been sampled for ERS invertebrates. So it would be interesting to do exploratory sampling (scenario 4). I would recommend either an intensive survey of W13, or hand searching and excavations of sites W13, W11, W15-17, particularly concentrating on eroding banks, which may provide the dominant ERS habitat.

**5. CONCLUSIONS AND RECOMMENDATIONS**

An ~6km section of the River Bollin contains many areas of ERS of high, to very high quality. It is recommended that several bars in this section should be surveyed for their ERS specialist invertebrate, and especially, beetle fauna. The best ERS on the River Dane has most likely already been surveyed, no action, or an invertebrate survey of one site is recommended for this river. The River Weaver is a sand bed river of very different character from most of the ERS sampled in the UK so far. An intensive survey of one bar together with its adjoining eroding banks, or several less intensive surveys of several bars are recommended.

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