

**Initial report on environmental impacts of unconsented
work on the River Bure at Saxthorpe**



June 2023

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1. Background

In March 2023 the Environment Agency became aware that a section of the River Bure at Saxthorpe/Corpusty had been subject to intensive maintenance work/dredging. Enforcement and Biodiversity officers visited the site on 17th April 2023 to investigate.

A search of Environment Agency records indicated that no permits had been consented, or exemptions registered, for any work to the river at this location.

This report relates to the section of the river adjacent to Saxthorpe village green. Work has been carried out from grid reference TG 11208 30311 downstream for a distance of approximately 110m to grid reference TG 11313 30310 (see Figure 1). Most of the work has been carried out on the main channel of the River Bure, but a short section of the mill bypass channel has also been affected. Both these channels are statutory Main River. Work on the bypass channel includes a new section of bank reinforcement using stone filled gabion baskets.

Of particular concern to the Environment Agency are the following aspects of the work:

- The removal of silt and vegetation from the channel does not meet the environmental requirements laid out in our landowner maintenance guidance document. The guidance document sets out how maintenance work can be undertaken in a manner that minimises the impacts of such work on the ecology and functioning of river systems and adjacent habitats.
- The activities undertaken on the River Bure, which include localised reprofiling of the banks and silt removal/bed deepening, as well as the reinforcement of a section of bank using gabion baskets, would normally require an Environmental Permit for Flood Risk Activities from the Environment Agency. No application to carry out this work has been received. However, any permit application that we might have received for the work, in its current form, would be refused due to the damaging impacts on the river habitat and ecology.
- The work is counter to the objectives of the Water Framework Directive (WFD). The River Bure upstream of the confluence with the Scarrow Beck (waterbody GB105034055690) is currently at Poor Ecological Status. The Environment Agency have a target to ensure that this waterbody reaches Good Ecological Status by 2027 at the latest. The dredging of the river could lead to deterioration in the status of this waterbody or may make it more difficult to achieve the WFD

objectives for the River Bure. It is likely to constitute “morphological harm” as defined by Section 161ZA of the Water Resources Act 1991.

- The removal of some tree/shrub cover and in-channel woody material from the riparian corridor, together with the removal of in-stream vegetation, has removed shading of the watercourse and resulted in a reduction in habitat complexity.
- Impacts on protected species. The River Bure is known for its high biodiversity value, supporting a number of species protected under the Wildlife and Countryside Act as well as Priority Species listed in Section 41 of the Natural Environment and Rural Communities Act. There are nearby records for water vole and brown trout. The River Bure itself is a chalk river, an internationally scarce habitat listed as Priority Habitat under Section 41 of the NERC Act.

The remainder of this report provides an overview of the ecological and geomorphological impacts of the dredging work, and provides initial suggestions of the types of measures that could be put in place to mitigate the damage that has been caused to the site.

Figure 1. The extent of dredging work (red line) on the River Bure at Saxthorpe.



2. Physical and ecological impacts of dredging on the River Bure

2.1 Physical impacts

The reach of the River Bure affected by dredging/desilting and bank reinforcement work is a relatively low gradient watercourse that in the past has been substantially physically modified by deepening, widening and straightening. This section of the main river channel is relatively deep due to being impounded behind the structures at Saxthorpe Mill. The bed substrate is predominantly composed of gravel, sand and silt. The mill bypass channel has a higher gradient with a bed substrate dominated by gravels and cobbles.

The key physical changes resulting from the work are as follows:

1. Silt removal from the channel and selected re-sectioning of the banks (see Photographs 1, 2, 3, 4, 5). Spoil removed from the channel has been spread in a strip approximately 5m wide adjacent to the river. The effect of this work has been to deepen and widen the river, simplifying the diversity of physical habitats and the flow and depth regime of the river. In places some of the gravel bed substrate has also been removed and can be seen mixed in with the finer sediment removed from the river (see Photographs 2,4,5,7,9). In the bypass channel, some of the natural river bank has been replaced by a hard edging of stone filled gabion baskets (Photograph 6). The bed of the first 20 metres or so of the bypass channel has been disturbed (Photographs 8 and 10), with some gravels moved to the channel edge (Photograph 9) and some deposited on the bank (Photograph 7). It is also possible that some gravel has been removed in connection with the construction of the gabion basket edging.
2. Removal of in-channel (emergent and submerged) and marginal vegetation. The fringing marginal vegetation of reed has been removed from the channel. Photograph 3 shows reed rhizomes which have been cut through where the bank has been reprofiled, and Photograph 4 shows stems of removed vegetation amongst the spread spoil. This will have impoverished the habitat for water vole and a range of other animal and plant species including brown trout.
3. Trimming of overhead tree cover on the opposite bank of the river (an activity which does not require a permit from the Environment Agency) has reduced shading of the river corridor.

Photograph 1. (Exhibit AM01A – P4170012) General view of affected reach showing spread spoil and reprofiled river bank.



Photograph 2. (Exhibit AM01B-P4170024) Reprofiled bank edge and gravel deposited on bank top. Upstream end of reach.



Photograph 3. (Exhibit AM01C-P4170016) Reprofiled bank edge showing cut through reed rhizomes/plant roots.



Photograph 4. (Exhibit AM01D-P4170019) Gravel and silt spread on bank adjacent to river.



Photograph 5. (Exhibit AM01E-P4170017) Gravel intermixed with silt and sand on river bank.



Photograph 6. (Exhibit AM01F-P4170001) Gabion baskets installed along right bank of mill bypass channel.



Photograph 7. (Exhibit AM01G-P4170009) Reprofiling of left bank of bypass channel and disposal of gravels (behind daffodils) on bank.



Photograph 8. (Exhibit AM01H-P4170003) Bypass channel showing reprofiled banks and disturbance to gravel bed.



Photograph 9. (Exhibit AM01I-P4170006) Gravel deposited at edge of bypass channel.



Photograph 10. (Exhibit AM01J-P4170005) Bypass channel showing disturbed gravel bed (left) and undisturbed bed (right).



2.2 Ecological and geomorphological impacts

Ecology

The key ecological impacts of the dredging work are likely to include the following:

1. The removal of silt and vegetation from the channel has resulted in a direct loss of biodiversity. Aquatic and marginal plant species, as well as invertebrates living amongst the vegetation and in the sediment, will have been killed through their removal from the river.
2. The dredging work has resulted in the simplification of habitats and a reduction in the quality of habitats. This means that there is less diversity in flow conditions and habitat type, with a resultant loss in biodiversity. The river, pre-works, provided greater structural habitat complexity which provided for the different life stages of animals including fish and macroinvertebrates. Removal of this complexity, through dredging and the removal of any obstructions, will have compromised the ability of the River Bure to support healthy, functioning, and diverse animal and plant communities.
3. It is likely that, in the absence of suitable mitigation measures, some fish were removed as an incidental result of the dredging. During the site visit on 17th April one stone loach was recorded in the bypass channel in the stretch affected by the work. The Environment Agency has a fish survey site (Site ID 162025), approximately 750m downstream of the reach affected by dredging. This site was last surveyed in 2022 when brown trout (a UK NERC Priority Species), stone loach, brook lamprey and three-spined stickleback were recorded. The simplification of habitats within the dredged reach, including the removal of in-channel and marginal vegetation and some gravels (which act as suitable spawning habitat), and the reduction in diversity of water depth and velocity, is likely to have reduced the ability of the affected reach to support healthy fish populations. The River Bure is designated as a salmonid river and so is sensitive to disturbance of gravels especially during the winter spawning season for brown trout.
4. The work has the potential to impact on water voles and their habitat. There are a number of historical records for water vole in Corpusty and Saxthorpe, and it is possible that they were present along the section of channel impacted by the work. Although no signs of water vole were recorded during the site visit in April 2023, this does not rule out the possibility that they were present at the time that work was carried out. The water vole is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is a priority species under the NERC Act (2006). It is a criminal offence to damage, destroy or block access

to their places of shelter or protection, or to disturb them in a place of shelter or protection (on purpose or by not taking enough care).

Geomorphology

The main impact of the dredging work in terms of geomorphology has been to simplify the channel cross section and cause a loss of morphological diversity compared with the pre-works condition. The re-sectioning of parts of the river banks, together with the removal of in-channel vegetation, has reduced flow diversity and reversed natural recovery, the process in which the channel size has reduced so that it is more in equilibrium with the flow regime of the river. The construction of gabion baskets to provide hard edging to a section of the channel has resulted in a further loss of natural river habitat.

The work will have locally reduced flow velocities, increasing the probability of the deposition of fine sediment on sections of the channel with gravel bed substrate. This in turn will reduce their suitability as habitat for specialised invertebrates or as spawning sites for fish such as brown trout and stone loach.

In terms of the Water Framework Directive, the dredging work has adversely affected the following hydromorphology quality elements:

- : Quantity and dynamics of water flow
- : River depth and width variation
- : Structure and substrate of the river bed
- : Structure of the riparian zone

The River Bure is considered to be Water Framework Directive waterbody sensitive to gravel removal.

Disposal of spoil from dredging a watercourse requires a waste permit or exemption (e.g. D1 waste exemption: depositing waste from dredging inland waters) from the Environment Agency. Exemptions need to be registered in advance of undertaking the work.

3. Possible measures to mitigate for the impact of dredging works

The initial assessment from visiting the site in April 2023 indicates that the ecological and geomorphological impacts of the dredging and associated works, as outlined in section 2 of this report, are significant. The removal of both biodiversity and sediment, and the consequent simplification of physical and ecological habitats, has had an effect on the ecological condition and natural functioning of this section of the River Bure. Many of these impacts could have been avoided by taking advice from the Environment Agency, undertaking pre-works ecological surveys, and complying with Environment Agency best practice guidance and mitigation. This would include

ensuring that no gravel was removed from the channel, that the banks were not reprofiled, and that a fringe of vegetation was retained along the channel edge. Had an application been made for a Flood Risk Activity Permit, as is required, suitable conditions would have been attached to that permit to prevent ecological harm.

A priority is to ensure that any future maintenance of this section of the River Bure is undertaken in a way that is environmentally sympathetic, legally compliant and recognises the multiple benefits that accrue from a healthy, functioning river system. Any maintenance work which is undertaken, either for land drainage purposes or to reduce flood risk to people or property, must be done in a manner that recognises and takes account of the ecological importance of the River Bure and the Government's environmental objectives for the river under the Water Framework Directive.

The following recommendations are made.

1. The Parish Council should consider commissioning a management plan for the river which fully takes account of the ecology of this important habitat, and the need to work with natural processes, whilst also taking account of flood risk considerations and the aspirations of other river users. This plan might include appropriate vegetation management (e.g. the retention of marginal plant species), a recognition of the need to protect valuable hard river bed substrate, and the need to retain natural channel margins.
2. Measures that could be implemented to improve the ecology of the river and mitigate for the loss of habitat due to gabion basked installation include the installation of woody material features within the channel and riparian tree planting. These measures will also help mitigate/compensate for the loss of natural bank caused by the construction of the gabion basket revetment along part of the bypass channel. Further information on these measures is given below.

Installation of woody material. Woody material is increasingly recognised as a vital component of healthy river systems. Selective insertion into the channel of tree branches and other woody material is a relatively quick and simple way of re-introducing physical habitat diversity to the degraded river channel. This will be of immediate benefit to fish and invertebrates, for example by providing cover and promoting flow diversity, and could be an important stop-gap measure to provide some areas of suitable habitat whilst the process of natural recovery takes place. Woody material would best be installed as flow deflectors anchored into the river bank.

These can be placed at low level within the channel so that they are completely submerged/flooded out during high flow conditions and do not cause any increase in local flood risk to people and property.

Woody material will also promote local deposition of sediment at the edges of the channel. When these areas of sediment become vegetated they will provide suitable foraging habitat for water voles, replacing habitat features that have been destroyed by the dredging work.

Riparian tree planting. Tree cover along river corridors is important for the following reasons:

- Trees provide physical habitat diversity that in turn supports a diverse range of animal and plant species.
- They provide underwater root systems of value to fish and invertebrates.
- Tree root systems stabilise river banks and protect them from erosion, especially on the outside of bends.
- By providing shade, trees suppress growth of aquatic vegetation and moderate extremes in water temperature.
- In the longer term, tree cover can provide a natural source of woody debris, a key component of river systems that is lacking in many lowland watercourses.
- Tree planting can enhance local landscape quality.
- Trees provide nesting sites for birds, and a food source for mammals, birds and invertebrates.

Selective planting of native tree and shrub species such as alder, crack willow hawthorn, spindle, hazel and field maple could, once they are established, significantly enhance the value of the river corridor. Intermittent tree planting will create a mix of light and shade along the river corridor and could, over time, suppress the growth of marginal vegetation if this is considered an issue at the site.