

West Newton Bridge B6351 Scour protection

Method Statement for application for Land Drainage Consent including Sediment Management plan

Version 4

Outline

Following a near catastrophic failure of the foundations during a flood event on the 6th September 2012, repairs are proposed to protect against future. The footing levels of the foundations have been shown to be shallow and are susceptible to undermining during flooding events. To prevent further possible damage to the bridge, it is proposed to install a concrete invert around the foundations together with other means to mitigate deposition.

The concrete slab bounded between lines of sheet piles, will replace the current river invert. The surface of this new invert will mirror the river bed with boulders embedded in the concrete surface and will be profiled to provide a central channel to aid fish passage. This central area is to have much larger boulders forming a channel to focus the flow, again, to further aid fish passage.

The proposals have been developed after a study by Cbec Eco-Engineering Ltd who have conducted an assessment of the hydrodynamic and sediment transport processes on the College Burn in the vicinity of the bridge. This report is appended to this application.

All areas of work have been subject to ecological survey, assessment, and consideration of the effects of the proposals on the river environment and ecology. An Appropriate Assessment has been undertaken by Econorth Ltd who have liaised with Natural England, the Environment Agency and the Conservation Team of Northumberland County Council in consideration of the proposals. Their findings are appended to this method statement.

A review of the hydro-geomorphology assumptions and modelling has been carried out by Malcolm Newson of River Catchment Services Ltd and this is appended to this method statement.

The soft engineering works to protect the river corridor from 'cut back' scour have been proposed to ensure that, in the short to medium term, the rivers' propensity to further meandering is limited. This is in accordance with the recommendations contained in Malcolm Newson's review. In essence these protection works will not change the river corridor, but will limit the immediate likelihood of significant alignment change.

Sediment Management Plan

A. General

An Ecological Clerk of Works (ECoW) will be employed directly to reinforce and ensure compliance on site with the below, section B and all required Environmental Legislation.

The role of the ECoW is will include the following elements:

- Toolbox Talk with key site personnel – highlighting key ecological and environmental issues.
- Monitoring sediment control and water treatment.
- Ensuring compliance with ecological method statements to protect species such as otter.
- Monitoring pollution prevention.
- Inputting into and overseeing site restoration from an ecological perspective.

All plant and machinery on site will have vegetable oils rather than mineral lubricants and spill kits will be available in the event of accidents.

Entry into the river corridor environment will be strictly in accordance with this method statement any/all Environmental Restrictions required by the Environment Agency and Natural England.

A weather watch will be undertaken so that operations started in any working shift can be finished thereby minimising the exposure to high waters from flash flooding. For example, should thundery weather be forecast then the contractor shall not carry out works that would put the bridge at risk of scour.

B. Filtration and sediment control

Control of sediment and filtration of water arising from the working areas is key to the successful delivery of this scheme. The contractor shall adopt the following measures at all times of the works where water is discoloured due to works processes before returning it to the watercourse.

- I. Sedimats and a line of straw bales shall be maintained on both sides of the river edge downstream of the works area. They shall be renewed as necessary.
- II. Works areas shall be bounded with dumpy bags to exclude flowing water. Pumps may extract water to create a positive flow into the works area but the water will need to be filtrated before being returned to the watercourse. Sediment grading is coarse in nature so clay particulates are not expected. Pump sizes are expected to be 2 to 3 inch but may need to be used in tandem. Should the means of filtrating water prove inadequate works shall cease until the filtration means are upgraded.
- III. Works are required to cast concrete in the watercourse. The method statement has a stated sequence so that concrete pours can be carried out in the dry. Should the dry environment prove impossible to achieve, water can be pumped from the works area but it could have a higher pH value than is acceptable due to contact with wet concrete and will require treatment before being returned to the watercourse. This will require provision of a silt buster type facility so chemicals can be added to the pumped water in a controlled manner.

Installation of concrete apron and sheet piling around bridge

Step 1 – Reduction of gravel levels to river invert profile – Sketch no HB127276/SK111.

This step and step 2 is required so that the river can be diverted temporarily through the west arch.

On the downstream side of the bridge, access to the area will from the works zone to demolish the old railway abutment – see site reference plan drawing number 23.

Machinery will move to the works area along an existing gravel shoal above water level.

A line of dumpy bags will be placed along the centre of the river so that flow is pushed away from the LH side. This will create the initial working zone. Sedimats will be placed on the LH side edge of the river to catch any minimal siltation.

Area B will be reduced in level so that the invert is equal to the corresponding river bed level. Arisings will be stored in the compound in the adjacent field. Once complete the excavator will cross the river and reposition the dumpy bags so that flow is directed to the LH side. Sedimats will also be laid to the RH edge of the river. Area A will be reduced in level to match area B. Arisings will be carried in a dumper and stored in the compound in the adjacent field. It is likely that the dumper will have to traverse the river several times.

Step 2 – Reduction of gravel levels to river invert profile – Sketch no HB127276/SK112.

The operation is the same as step 1 but is carried out to the upstream side of the bridge.

The excavator will have to cross the river to get to area C and a dumper will have to cross the river several times with arisings to be temporarily deposited in the compound.

Step 3A – Pre-augering of gravel along line of proposed upstream sheet pile wall – Sketch no HB127276/SK113.

Access to the working area for the piling rig will be either over the flood bund as shown on the sketch or, the machine will have to track down the gravel shoal upstream of the work on the RH side of the river. This route is approximately 250 metres long.

Management of the river flows and filtration will be carried out as step 2. The piling rig will have to cross the river for the operations.

To create a stable piling platform, the gravel along the line of the new pile wall will have to be compacted. This line will be approximately 5 metres wide but is critical for the safe operation of the piling rig and crew. The compaction process will also aid the stability of the river bed following installation of the permanent works.

The piling rig will drill into the gravels/cobbles along the line of the sheet piled wall to ensure that there are no significant obstructions. If any are found an excavator will dig out the stones with work carried out in the zone of water management. Filtration of any water can be carried out by pumping to a siltbuster type facility and returned to the river.

Step 3B – Pre-augering of gravel along line of proposed upstream sheet pile wall –

Sketch no HB127276/SK114.

River flows will be temporarily diverted to the LH bank and through the west arch by placing dumpy bags down the centre of the river. The river will follow the channel already excavated in earlier steps.

Again to create a stable piling platform, the gravel along the line of the new pile wall will have to be compacted in a similar way to step 3A.

The piling rig will drill into the gravels/cobbles along the line of the sheet piled wall to ensure that there are no significant obstructions. If any are found an excavator will dig out the stones with work carried out in the zone of water management. Filtration of any water can be carried out by pumping to a siltbuster type facility and returned to the river.

Step 4A – Installation of piling to proposed upstream sheet pile wall – Sketch no HB127276/SK115.

River flows will be temporarily diverted to the RH bank by placing dumpy bags down the centre of the river.

The piling rig will cross the river to install the sheet piles on that side of the river. Sheet piles will be carried by an excavator that may have to cross the river to deliver the sheet piles.

The piling rig will install the sheet piles. All piles installed in any working shift will be fully inserted so that the free board height is minimal and presents the least risk of retention of any flood waters.

Water management and filtration will be as previous steps.

Step 4B – Installation of piling to proposed upstream sheet pile wall – Sketch no HB127276/SK116.

River flows will be temporarily diverted to the LH bank and through the west arch by placing dumpy bags down the centre of the river. The river will follow the channel already excavated in earlier steps.

The works will be carried out by working within the controlled area of water management.

The piling rig will install the sheet piles. All piles installed in any working shift will be fully inserted so that the free board height is minimal and presents the least risk of retention of any flood waters.

Water management and filtration will be as previous steps.

Step 5A – Pre-augering of gravel along line of proposed downstream sheet pile wall – Sketch no HB127276/SK117.

River flows will be temporarily diverted to the LH bank but through the centre arch by placing dumpy bags down the centre of the river.

Again to create a stable piling platform, the gravel along the line of the new pile wall will have to be compacted in a similar way to step 3A.

The piling rig will drill into the gravels/cobbles along the line of the sheet piled wall to ensure that there are no significant obstructions. If any are found an excavator will dig out the stones with work carried out in the zone of water management. Filtration of any water can be carried out by pumping to a siltbuster type facility and returned to the river.

Step 5B – Pre-augering of gravel along line of proposed downstream sheet pile wall –

Sketch no HB127276/SK118.

River flows will be temporarily diverted to the LH bank and through the west arch by placing dumpy bags down the centre of the river.

Again to create a stable piling platform, the gravel along the line of the new pile wall will have to be compacted in a similar way to step 3A.

The piling rig will drill into the gravels/cobbles along the line of the sheet piled wall to ensure that there are no significant obstructions. If any are found an excavator will dig out the stones with work carried out in the zone of water management. Filtration of any water can be carried out by pumping to a siltbuster type facility and returned to the river.

Step 6A – Installation of piling to proposed downstream sheet pile wall –

Sketch no HB127276/SK119.

River flows will be temporarily diverted to the LH bank but through the centre arch by placing dumpy bags down the centre of the river. The river will follow the channel already excavated in earlier steps.

The works will be carried out by working within the controlled area of water management.

The piling rig will install the sheet piles.

Water management and filtration will be as previous steps.

Step 6B – Installation of piling to proposed downstream sheet pile wall –

Sketch no HB127276/SK120.

River flows will be temporarily diverted to the LH bank and through the west arch by placing dumpy bags down the centre of the river. The river will follow the channel already excavated in earlier steps.

The works will be carried out by working within the controlled area of water management.

The piling rig will install the sheet piles.

Water management and filtration will be as previous steps.

Step 7A – Construction of concrete invert between sheet piled walls –

Sketch no HB127276/SK121

Water management will be maintained as the previous step.

Small tracked excavators will reduce the levels of gravel between the sheet piled walls to the necessary levels. Arisings will be taken by dumper to the temporary stock piles in the compounds. This will require the dumpers to cross the river a number of times on the downstream side of the bridge. On the upstream side, the dumpers will exit via a dry route.

The inverts will be concreted as per the drawings. The operations are expected to be carried out in dry conditions but if water has to be removed, it will be pumped to adjacent fields before returning naturally to the river after filtering through ground strata.

Step 7B – Construction of concrete invert between sheet piled walls – Sketch no HB127276/SK122

River flows will be temporarily diverted to the RH bank by placing dumpy bags down the centre of the river.

Small tracked excavators will reduce the levels of gravel between the sheet piled walls to the necessary levels. Arisings will be taken by dumper to the temporary stock piles in the compounds. This will require the dumpers to cross the river a number of times on the upstream side of the bridge. On the downstream side, the dumpers will exit via a dry route.

The invert will be concreted as per the drawings. The operations are expected to be carried out in dry conditions but if water has to be removed, it will be pumped to adjacent fields before returning naturally to the river after filtering through ground strata.

Installation of log arrays for training water through the centre arch of the bridge

Construction of log arrays upstream of bridge – Sketch no HB127276/SK123.

The river will be temporarily diverted away from the work areas by the placement of dumpy bags around the work zone. Sedimats and straw bales will be positioned downstream as shown the enclosed sketch to catch or trap any siltation.

The log arrays will be anchored by timber soldiers buried in excavated pits.

Any water removed by pump from the works area will be filtrated before being returned to the watercourse.

An excavator will have to transverse the river several times together with dumpers who will be carrying the timber to construct the arrays.

Installation of log stockades for protection against further 'cut back' scour during flood events

Construction of soft engineering log stockades upstream of bridge – Sketch no HB127276/SK124.

The works are approximately 5 to 10 metres away from the edge of the river so water management techniques are not envisaged..

The log stockades will be installed by being buried in excavated pits.

The access route will be along a track remaining from the emergency works carried out in 2012.

Demolition of old railway abutment and re-profiling of embankment to remove pinch point in river.

Demolition of old railway bridge abutment – Sketch no HB127276/SK125.

The access route from the compound to the works area will not require the removal of any trees. The few shrubs that need clearing will be removed winter 2014/15.

The works are adjacent to the river but no work is envisaged in the water.

The masonry of the abutment will be taken down by an excavator and temporarily stored in the compound. All stone will become the property of Westnewton Estate.

The finished earthworks profiles will be recovered with soling initially removed prior to the abutment demolition. The lower slopes will be protected from scour with a pegged down jute geotextile.

Raising crest height of flood bund and provision of scour protection to existing ‘cut back’

Raising crest height of flood bund and provision of scour protection to existing ‘cut back’– Sketch no HB127276/SK126.

Vegetation to areas 3 and 4 will be removed in winter.

Access to all areas will be along the existing farm tracks and across grass pasture to area 6. No formal tracks will be created on the grass pasture.

No works are within 10 metres of the river corridor so no water management plans are proposed.

Top soil to area 4 will be stripped and set aside. Material will be transported from area 3 by dumper to area 4 where it will be spread and the topsoil reinstated. Planting will be agreed with the landowner.

An existing farm track over the flood bund will be reinstated in like for like materials.