Norwich Western Link

Drainage Strategy Report

Appendix 15: Construction Surface Water Management Measures

Summary for Planning Application

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Foreword

Norfolk County Council, as Highway Authority (hereafter referred to as 'the Applicant'), is seeking to obtain planning permission for the proposed Norwich Western Link Road (hereafter referred to as the 'Proposed Scheme') located to the north-west of Norwich.

Ferrovial Construction UK Limited (hereafter referred to as 'FC') has been commissioned by the Applicant to produce this summary of the most relevant Construction Surface Water Management Measures to support the planning application.

The work areas subject to the assessment as described in this document are shown in the Planning Application Drawings references 2.03.00 General Arrangement Plans, 2.06.01 to 2.06.09 Structures Drawings, 2.07.00 Landscape Design Plans, 2.08.00 Drainage Layout Plans and 2.08.01 Drainage basin details.

1 Glossary of Abbreviations

NWL – Norwich Western Link

NCC – Norfolk County Council

FC – Ferrovial Construction

CSWMP – Construction Surface Water Management Plan

PED - Pre-Earthworks Ditch

IDB – Internal Drainage Board

LLFA – Lead Local Flood Authority

EA – Environmental Agency

NE – Natural England

SSSI – Site of Special Scientific Interest

SAC – Special Area of Conservation

GIS – Geographic Information System

TSS – Total Suspended Solids

WC – Watercourse

2 Required Consents

2.0.1 The activities within the river Wensum SAC and SSSI areas and at the Foxburrow watercourse are regulated by the Environmental Agency, Norfolk Rivers IDB, Natural England and the Norfolk County Council Flood Authority.

2.0.2 Additionally, consents are required from the LLFA for temporary and permanent crossings located outside the EA and IDB boundaries.

2.0.3 Regulated temporary works related to the water environment will involve:

- The erection or installation of structures over, within or close to the main rivers and associated watercourses.
- Any other activities carried out on the floodplain of the River Wensum or in proximity (less than 8m) of the bank of a watercourse.
- Connection of PEDs to existing infiltration basins or temporary settlement ponds.

2.0.4 For the installation of temporary and permanent crossings, options to divert the watercourse could include temporary dams/plugs in the existing channel to control flows with the construction of a parallel temporary channel, or over pumping to convey the flows downstream. The construction methodology will be agreed with the EA, IDB and LLFA during the consenting process or discharge of conditions.

2.0.5 Given the complexity of the Proposed Scheme, the consents strategy is likely to be streamlined and a bespoke approach adopted through liaison and coordination with the regulating parties ahead of application.

3 Temporary Ditches

3.0.1 There will be three types of temporary ditches:

- Clean water perimeter cut-off ditches: these will be installed to re-direct the clean water entering the site along the boundary line towards to existing protected watercourses discharge points. No water treatment is required as the flow will avoid contact with temporary works areas.
- Clean water diversion within the boundary: if an existing clean water ditch flows within the site boundary, and it is classed as a protected watercourse, the water flow may need to be temporarily diverted to allow the construction works to proceed. The diversion must be designed ensuring that the clean water does not get in contact with polluted surfaces or runoff. This activity will require consenting by the regulating bodies, including the LLFA.
- Dirty water ditches within the boundary: these ditches will be installed as a temporary solution around the stockpiled areas or parallel to the temporary access roads/haul roads to help collecting and driving the water to the treatment areas before discharge.

  All areas where earthworks are to be carried out (temporary or permanent excavations, stockpiles, open cuts, fills etc) will be provided with dirty ditches as needed. The final design of the internal ditches can be amended based on their actual catchment areas. The target is to avoid that any potential polluted water is discharged into any existing watercourses or mixed with clean surface water at any location within the construction boundary unless it has been processed at the appropriate treatment plant.

  If required, these ditches will be lined with erosion mats or similar erosion protection elements.

3.0.2 As a general approach for designing the temporary ditches, the return period year selected will be the 1 in 5 yrs and always ensuring the proposed works will not cause an unacceptable increase in flood risk. The management of all the

surface water (clean and potentially polluted) will be by gravity as much as possible, avoiding the use of pumping systems.

Figure 3-1 Temporary cut-off ditches

Figure 3-2 Rip rap protection of outlets

3.0.3 It is assumed that the permanent infiltration/attenuation ponds that are designed for the permanent drainage system are to be built at any stage of the programme, not necessarily at the beginning of the works, and therefore they

are not available for use as outfalls for temporary drainage. However, this approach may be revisited once the programme of works is fixed.

3.0.4 Different management strategies have been considered for each of the temporary facilities depending on their entity: water nature, occupied area, type of temporary construction, treatment needs, etc.

3.0.5 Three different approaches have been considered:

3.1 Management approach 1: main compounds.

3.1.1 This will be considered for the temporary locations that occupy a significant area of the natural catchment, are to be paved, and the runoff collected on the paved area needs to be treated and/or stored.

3.1.2 The natural catchment area surrounding the compound drains slightly towards the site due to the topographical conditions. Topographic analysis in GIS will determine all off-site surface water sub-catchments that intersect with the site. Hydrological routing analysis determines the off-site hydrological overland flow paths which intersect the site boundary. Every overland flow ingress location entering the site is identified, and clean water drain locations are delineated to intercept water at these ingress points.

3.1.3 The PEDs will be used as clean water conveyance systems and must be excavated prior to the compound construction.

3.1.4 The runoff from the impermeable area that could be potentially polluted will be drained by gravity towards the settlement pond or treatment plant installed at the lowest part of the compound. The treated water will be conveyed to the nearest PED that will have a discharge.

3.2 Management approach 2: satellite and working areas.

3.2.1 For those temporary elements that will not occupy a significant area encroaching a natural catchment, cut-off ditches will be constructed at the upstream perimeter, where deemed needed.

3.3 Management approach 3: haul roads.

3.3.1 Haul routes, access roads and parking areas can generate significant quantities of water polluted with sediment. The haul road sections that are to be paved, soil stabilised or laid with capping are considered impermeable surfaces. In all cases they will have their own drainage system based mainly in a geometric crossfall and ditches. These ditches will run parallel to the access roads and haul roads and will convey the potential polluted water to the water treatment plants.

3.3.2 The temporary haul road ditches will run parallel to the haul road up to the outlet at the water treatment plant.

3.3.3 The following recommendations will be adhered to and applied in the management of surface water around the access roads, as needed:

- Applying binder to road surfaces. This will also help to reduce dust pollution during dry weather.
- Prevent excess water running along the road by installing small earth bunds (like speed bumps) or cut-off ditches at regular spacing to direct water into roadside ditches.
- Where haul routes cross watercourses, adopt measures to prevent sediment-laden run-off from entering them. This can be done by ensuring crossing structures have edge upstands or bunds e.g. straw bales, sandbags or earth.

4 Flood Risk Controls

4.0.1 The following measures are recommended to be adopted during the construction phase as part of the CEMP in order to reduce adverse flood risk during the construction phase:

- Adoption and implementation of a Flood Action Plan;

- Contractor to sign up for flood warnings and check online warnings regularly.
- Avoid working in the floodplain or watercourse during high flow events, intense rainfall events or when a flood warning is issued.
- Site compound(s) and welfare facilities located outside of the 1 in 1000 annual probability floodplain and in the path of identified overland flow routes;
- Do not store unnecessary materials and mobile machinery within the 1 in 1000 annual probability floodplain or in the path of identified overland flow routes: and,
- If flood warning issued, move all machinery and equipment out of the 1 in 1000 annual probability floodplain. If this cannot be completed in a safe time, secure equipment to prevent it being washed away. A flood risk management action plan will be prepared before the start of the construction works, including a demobilisation procedure in the event of a flood warning.

4.0.2 Environmental Permits for flood risk activity will be obtained from the Environment Agency. Any work within proximity of an IDB designated ordinary watercourse will also require Land Drainage Consents.

4.0.3 The Lead Local Flood Authority (Norfolk County Council) will be consulted for any further requirements.

5 Pollution, water quality and emergency control measures

5.0.1 Pollution prevention measures to be implemented include:

5.1 Installation of sediment barriers

5.1.2 Sediment barriers avoid the soils or earth material entering the watercourses or sensitive areas due to dragging.

5.1.3 The uses of these barriers can be:

- At the toe of embankments.
- Around the temporary stockpiles.
- Along watercourses or natural flow paths.
- Around temporary constructions.
- Around ditches or smalls dams at culverts.

5.1.4 They can be of various types:

- Straw bale barriers. This sediment retention system consists of the installation of one or more rows of straw bales entrenched and anchored to ensure their stability. The composition of the bale will be entirely vegetal material, with the exception of the material used for holding it together. The minimum width of each bale will be 50 cm, the height of 40 cm and the length of 120 cm, having a minimum mass of 20 kg. When they are no longer needed, the bales, including accumulated sediment, are removed. They have some limitations: they are potential source of seed dispersal of invasive plants, as well as an attractive food source for some animals. As they are degradable, they need an intensive maintenance and inspection regime.

Figure 5-1 Example of a straw bales barrier for prevent spread of loose material.

- Geotextiles. The geotextile is a permeable textile material with a flat structure that is made with specific hydraulic properties and facilitates

soil retention. The barrier consists of a vertical fence anchored to the ground at the bottom. The geotextile material of these fences must retain suspended solids of a larger diameter 0.02mm.

5.1.5 These fences are more effective than straw bale barriers (97% retention compared to 67% for the straw bales).

5.1.6 The fence must have a maximum height of 60 cm and be installed buried in trenches of at least 15 cm, with its lower end bent towards the area where the runoff water is coming from, in order to retain it and stop it from flowing under the fence.

Figure 5-2 Geotextile

5.2 Treatment ponds

5.2.1 Settlement ponds will be placed at the lowest points of the worksite for treating the polluted water from the works.

5.2.2 Their capacity will be assessed depending on the catchment area they are coping with. Also, a hydraulic/hydrologic assessment will be done in case they need to act also as temporary storage lagoons. These temporary treatment basins will not be constructed where the permanent basis is to be excavated.

5.2.3 Settlement ponds need maintenance, especially after a rainfall event.

5.2.4 No foul drainage or contaminated surface water run-off (including any silty water or concrete wash water) will be discharged into any borehole, well, spring,

soak away, or watercourse including the Wensum floodplain and dry ditches, without prior filtering or treatment. Silt will also settle within the pond and can be removed using an excavator as required.

5.2.5 The location of the ponds will be in accordance with the drainage design principles described in Section 2. Some of them could act as storage pond if attenuation is to be provided before the discharge.

Figure 5-3 Example of settlement ponds

5.3 Special anti-pollution measures for the construction of the Wensum Viaduct.

5.3.1 Bailey bridge will be provided with anti-spillage protection.

Figure 5-4 Anti-spillage elements installed along a bailey bridge

5.3.2 Bridge decks are to be sealed. Where inlets to existing surface water drainage are present on- site (e.g. road gullies or yard drains), protect them from run-off polluted with sediment. This is best done by diverting the water away from the inlet to treatment facilities. Where this is not possible, create a bund around the surface water drain to prevent contaminated water entering.

5.4 General pollution prevention measures

5.4.1 Plant used in the vicinity of the SAC and SSSI will be maintained and checked daily to confirm they are operating efficiently and are leak-free.

5.4.2 All plant and equipment have built in drip trays or will be placed on plant nappies on external drip trays to collect any leaks or spillages which may occur.

5.4.3 Site compounds located close to potential receptors will be provided with pollution prevention measures to minimise the risk. The control measures may include edge protection, bunded drip trays for standing pumps, chemical storage containers, double bunded fuel tanks and spill kits.

5.4.4 Spill response training will be delivered on site by the environmental team. Spill kits –these are located next to the water treatment systems around the site and on all plant working and travelling across site, with additional spill kits being

placed around the ponds to aid if a large spill occurs to stop any contamination of the water being stored in the ponds.

5.4.5 Designated fuelling areas will be established at (or close to) the working area taking into account that no refuelling of vehicles or equipment will take place in close proximity of any source of water such as clean water and dirty water ditches and ponds.

5.4.6 Fuel storage areas will be subject to a separate risk assessment and measures implemented accordingly.

5.4.7 Where possible fuel operated equipment will be changed to electric e.g., pumps within the support fluid plant.

5.4.8 Biodegradable hydraulic oil will be used wherever possible.

5.4.9 Support fluid plant will be contained within a bunded area.

5.4.10 Support fluid pipes will be buried where possible to minimise risk of damage and subsequent leaks.

5.4.11 All temporary crossings over watercourses will be fitted with edge protection to prevent the fall of debris. Also, the grading of the roads will be designed to drain towards the embankments, not toward the watercourse.

5.4.12 Analysis of treated water will be taken prior to water being discharged. Records will be kept of the following to demonstrate license compliance:

5.4.13 Running hours

5.4.14 Total volume of water treated (via a flow meter)

5.4.15 pH and TSS will be tested on a regular basis unless there is a significant change to the system or concerns are raised regarding the quality of the water during daily inspections.