



A5 Western Transport Corridor (A5 WTC)

Appendix TNI - Theme Report: Fisheries

21 July 2016

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Paper on Fisheries

Low flow channels

1. Within the River Foyle catchment, the design for culverts that would be provided where our work with Loughs Agency has identified that salmonid fish may be present, allows for a 350mm embedding of the culvert base below existing ground level and import of boulders and clean gravels which have been screened to ensure no invasive species are introduced. The boulders and gravels will be filled to the existing ground level to recreate suitable substrate conditions and permit a narrower channel to be present during periods of lower flow. The channel will not be completely filled so as to allow for natural recruitment of river bed material and formation of a 'natural' channel.
2. Boulders will be positioned upstream and downstream of the culverts to enhance the suitability of these locations as resting areas for salmonids prior to and following the passage of these fish through the structures. Placement of boulders and gravel within the culverts and upstream and downstream of them will be undertaken in consultation with Loughs Agency personnel.
3. Within the Blackwater Catchment, Inland Fisheries has requested provision of specific low-flow channels within culverts they have identified as having fisheries importance. Fisheries importance includes the possible presence of salmonid, eel and lamprey species.
4. We confirm that the detailed design will include low flow channels at the following locations:
 - S3-PC-34
 - S3-PC-31
 - S3-PC-30
 - S3-PC-44
 - S3-PC-48

A proposed detail of the low flow channel arrangement is included in D_TNI Appendix_9816_62199_Low Flow Channel.

Silt management

5. During construction and operation of any major road scheme, there is a high risk that mobilised sediments can enter watercourses. High levels of suspended sediments in water can cause harm to fish, for example, by

reducing their ability to obtain oxygen from the water and increasing the difficulty of their finding prey items.

6. Accordingly, the proposed scheme has been designed to meet the all appropriate water quality requirements, including Total Suspended Solids (TSS), a measure of sediment load in the water.
7. To meet this requirement the drainage design has utilised the Highways Agency Water Risk Assessment Tool (HAWRAT). HAWRAT is an assessment tool which is recommended in Volume 11 of the DMRB and which has been agreed with the statutory bodies responsible for water quality throughout the UK. NIEA has agreed it as the appropriate means of assessing the discharge concentrations for the proposed scheme. The outcome from the application of the HAWRAT is that a discharge will either pass or fail in light of the predicted concentrations of sediments and other pollutants and the sensitivity for the receiving watercourse. Where the evaluation has indicated an outfall will fail, appropriate combinations of mitigation measures have been identified and the evaluation has been re-run until the outfall achieves a pass.
8. In addition to the statutory requirements for drainage outfalls, reference has been made to the Joint Nature Conservation Committee Common Standards for Monitoring (see Appendix_TNI_Core Documents_9816_62199_CSM¹) gives a guideline annual mean of 25 mg/l TSS as a limit to protect fish.
9. The calculations relating to the 25mg/l downstream concentrations have involved use of the local standard annual average rainfall value in combination with the impermeable area of each drainage network to establish an annual volume of water draining through each network to outfall. The sediment loading has been compared to the receiving annual water flow volume and TSS data for the receiving watercourse. Data for TSS was gained from a combination of Loughs Agency and NIEA Monitoring Stations and surveys undertaken by Mouchel prior to the publication of the A5WTC ES 2010. Where the calculation has indicated a concentration will exceed the in-stream threshold, appropriate combinations of mitigation measures have been identified and the calculation has been re-run until the outfall achieves a pass.
10. The identification of the specific mitigation measures proposed for each drainage outfall has involved the adoption of the most onerous combination of measures in light of the outcome of all three evaluations.

¹ Please note, Core Documents will be available on a5wtc.com from mid-August

11. Where more than one outfall discharges into the same reach of a watercourse the combined impacts will be more significant. In these circumstances the outfalls were subject to an aggregate assessment in HAWRAT.
12. To aggregate the outfalls the drained areas were simply added together. The location on the watercourse used for the cumulative assessment was positioned downstream of the last outfall in the reach. For this purpose a reach is defined as a length of watercourse between two confluences, as the available dilution and stream velocity will naturally change at confluences and influence the assessment.
13. Watercourse reaches can vary greatly in length. Therefore, for the assessment of the impacts of soluble pollutants, only outfalls within 1km of each other along the length of a watercourse were aggregated for cumulative assessment. When assessing the combined impact of sediment bound pollutants, outfalls within 100m of one another were assessed.
14. Construction related to earthworks and structures can involve in the release of sediments and other construction related pollutants into watercourses. In the context of the proposed scheme this could result in loss of spawning and nursery habitat used by or direct harm to fish as a result of concentrations of sediments and other pollutants in the water.
15. Risks will occur where:
 - localised in-stream works and works on the bankside of watercourses will be required for the construction of temporary and permanent bridges, culverts, watercourse diversions and headwalls for drainage outfalls;
 - construction of earthworks to establish the vertical alignment for the proposed scheme is located within 50m of the watercourses;
 - construction of filter drains, ditches, swales, grassed channels and wet and dry ponds is required to attenuate and carry road related run-off to drainage outfalls; and/or
 - site compounds and materials storage areas are located close to watercourses.
16. The installation of rip-rap to protect bridge abutments will require the placing of rock-filled gabion mattresses on the profiled and consolidated banks at the base of bridge abutments. Measures and requirements detailed in Annex 2.4 of the draft Construction Environmental Management Plan (CEMP) (see Appendix TNI_Core Documents_9186_62199_CEMP²) will be adhered to minimise potential sediment release into watercourses to negligible levels.

² Please note, Core Documents will be available on a5wtc.com from mid-August

Contractors will also be required to ensure imported rock does not contain invasive species of plant.

17. The temporary bridges over the Burn Dennet, Glenmornan, River Derg and Fairy Water will be clear span temporary bridge structures that will be installed at a level which allows for flood water to pass underneath, and does not block movement of animals along the watercourse corridor.
18. The installation of culverts and watercourse diversions will result in disturbance to watercourse channels and banksides and could result in consequent release of sediments into the watercourses. The proposed method of construction whereby culverts on diverted sections of watercourse will be completed prior to abandonment of the relevant section of existing channel, and temporary sections of diverted watercourse will be provided along watercourses where culverts are to be constructed on-line, will substantially limit potential release of sediments into waters of salmonid presence or potential.
19. As illustrated in Figure 7 (C_ Appendix TNI_9186_62199_Figure 7) headwalls will generally be of concrete construction. The area which will be subject to disturbance and the volumes of soils which will require to be excavated will be small. Excavated soils will be temporarily set aside a minimum of 3m from the top of the bankside and any not required for reinstatement of the bankside will be removed from site once reinstatement of the bankside profile is completed. The activity is one which will be of short duration.
20. The risk will be greater where outfalls are required on smaller tributaries and headwaters with relatively low volumes of flow. In these locations the works will be programmed for implementation at times of lowest flow between May and September.
21. Spillage of fuels and oils associated with machinery required for earthworks and installation of the structures could result in release of hydrocarbons in all of the above locations. The presence of cement in storage prior to use and release of such contaminants into watercourses as structures are built could result in mortality or harm where the watercourses are used by Atlantic salmon.
22. While the Water Framework Directive identifies a guideline for suspended solids levels to be kept below 25 mg/l for fish species to thrive, Loughs Agency have raised concerns that the risks associated with sediments relative to Atlantic salmon will be greater during construction rather than during use of the proposed scheme upon completion of construction. The Agency's concern particularly relates to the proximity of work activities where sediments will be generated and potentially released into parts of the watercourses where there is spawning and nursery habitat and has stipulated

a requirement for a maximum increase of 10mg/l of TSS during construction above background levels in such locations.

23. Mitigation measures have accordingly been discussed with Loughs Agency which are focused on the achievement of both thresholds in accordance with the status of the watercourses as ones used for fish passage and ones where salmonid nursery and spawning habitat is present. The measures have been formalised in Section 2 of the draft Silt Management Plan (SMP) (see Appendix TNI_Core Documents_9186_62199_SMP³) and will be a mandatory requirement of the contract-specific SMPs which contractors will be required to prepare agree with TNI and Loughs Agency prior to the commencement of works.

³ Please note, Core Documents will be available on a5wtc.com from mid-August