

# Scheme Wide Silt Management Plan

A5 Western Transport Corridor

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*Produced for*



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# Contents

<b>Document Control Sheet</b> .....	<b>ii</b>
<b>Contents</b> .....	<b>iii</b>
<b>1 Introduction</b> .....	<b>1</b>
<b>2 Silt Mitigation</b> .....	<b>3</b>
2.1 Scheme Overview .....	3
2.2 Sensitive Areas .....	3
2.3 Environmental obligations of the project during construction phase .....	6
2.4 Silt Management .....	7
2.5 General Construction Policies .....	8
2.6 Installation Programme .....	8
2.7 Working in the vicinity of water / Buffer zones.....	8
2.8 Temporary Haul Roads .....	9
2.9 Settlement Ponds .....	9
2.10 Exposed Ground and stockpiles.....	10
2.11 Excavations .....	10
2.12 Over Pumping .....	10
2.13 Plant Crossings .....	11
2.14 Sampling .....	11
<b>3 Flood Defences</b> .....	<b>13</b>
<b>4 Monthly Reporting</b> .....	<b>Error! Bookmark not defined.</b>

<b>Appendices .....</b>	<b>15</b>
Appendix A – Scheme Alignment .....	16
Appendix B – Example Watercourse Crossing Construction Method Statement .....	17
Appendix C – Example Temporary Retention Pond Calculations .....	18
Appendix D – Watercourse Haul Road Crossing Details.....	19

# 1 Introduction

- 1.1.1 This plan sets out site controls for management of sediment generated from over pumping during the construction of the new culverts and precipitation run off during earthwork operations.
- 1.1.2 All relevant construction activities for temporary and permanent works will follow relevant environmental legislation in consultation with Northern Ireland Environment Agency (NIEA) and where required, Rivers Agency, Loughs Agency and the Department of Culture Arts and Leisure, Inland Fisheries Team (DCAL). The main objective of the Silt Management Plan is to ensure that all drainage of temporary works is carried out in adherence with current regulation and to provide guidance on how to prevent water pollution.
- 1.1.3 Various agencies are responsible for control of distinct elements of the works:
- Rivers Agency – proposals do not cause flooding upstream of the works.
  - NIEA – discharge of precipitation water, extraction and ecological licenses.
  - Loughs Agency – fish within the Foyle Catchment.
  - DCAL – fish within the Blackwater Catchment.
- 1.1.4 The construction phase of all projects is a period within which there is a significant potential for pollution, in particular silt pollution to local watercourses due to unearthed alluvium. The objective of this plan is to provide guidance on the relevant statutory provisions, including any consents required, in respect of the water environment, to protect both physical habitat and morphology and to avoid unacceptable adverse impacts including changes to flow volume, water levels and water quality due to construction.
- 1.1.5 This plan aims to address the requirements of the Rivers Agency, NIEA, Loughs Agency and DCAL and detail Road Service's strategy for dealing with these key environmental risks.
- 1.1.6 A Discharge License will be required from NIEA to enable the works to commence. This licence will be granted for each phase of the works and the works will then be monitored on a month by month basis by the NIEA. Each month contractors will be required to issue a monthly return to the NIEA which will be the projected discharges for the following month. These will be linked to the construction programmes. These plans will be reviewed every three months and updated if required.

- 1.1.7 Where construction activities near water courses and water bodies are essential, steps have been undertaken to identify sufficient mitigation measures for the protection of the watercourses against pollution. The Silt Management Plan also includes details for pollution prevention measures and construction methodologies to be incorporated during the construction phase of the project.
- 1.1.8 Caution is required to prevent pollution and/or environmental damage, particularly when the following activities are undertaken:
- Construction of permanent and temporary bridges.
  - Discharges into a surface water drainage system.
  - Operating plant or machinery in, or in the vicinity of water.
  - Discharges of surface water run-off.
  - Laying of pipeline or cable.

## 2 Silt Mitigation

### 2.1 Scheme Overview

- 2.1.1 The proposed A5WTC would be an 85km long dual carriageway, running between New Buildings and the border with the Republic of Ireland (ROI), immediately south of Aughnacloy.
- 2.1.2 The proposed scheme runs along the Foyle Valley, close to the River Foyle, crossing the Burn Dennet
- 2.1.3 A full description of the scheme alignment is presented in Appendix A.
- 2.1.4 The works consist of a number of watercourse crossings which require the construction of new piped or box culverts to carry the streams under the new mainline. An example detailed method statement has been developed to control the construction of these and is included in Appendix B.

### 2.2 Sensitive Areas

- 2.2.1 The following areas are considered to be particularly sensitive with respect to potential impacts from pollution which may result from inadequate drainage control:
- 2.2.2 The River Foyle has a catchment area of approximately 2890km<sup>2</sup> and extends into the counties of Londonderry, Tyrone and Donegal. The major tributaries of the Foyle include the Burn Dennet, Glenmornan, Finn, Mourne, Strule, Owenkillew, Derg, Fairy Water, Camowen and Drumragh Rivers. The northern section of the proposed route lies within the Lower Foyle Catchment, where the Mourne and the Finn converge at Strabane to form the River Foyle. From Strabane the Foyle flows north to Londonderry and Lough Foyle. The lough is tidal and exerts a tidal influence up the River Foyle as far as Strabane. The tidal reach of the Foyle has a tidal range of approximately 3m and is up to 750m wide in places. The main tributaries to the Foyle in the vicinity of the route are discussed in the following paragraphs. However, there are also a significant number of smaller tributaries which the route crosses. These tributaries are generally large man-made field drains and small streams which have been heavily modified / straightened where they pass through villages and agricultural land. The proposed scheme runs along the eastern side of the River Foyle from New Buildings to Strabane, primarily through agricultural land.
- 2.2.3 The Burn Dennet has a catchment of approximately 150km<sup>2</sup>. It rises in the Sperrin Mountains, and flows 35km west to the River Foyle. The catchment is predominantly agricultural, although there are significant sand and gravel quarries close to its lower reaches. The Proposed Scheme crosses the river in the vicinity of Burn Dennet Bridge. Here, the watercourse is approximately 15m wide and typically transitional in character, the valley being relatively unconfined with a wide floodplain and a channel which is relatively shallow in gradient and meandering in form with riffle/pool sequences.

- 2.2.4 The Glenmornan River has a catchment of approximately 35km<sup>2</sup>. It rises in the foothills of the Sperrins and flows 16km west to the River Foyle passing through the villages of Artigarvan and Ballymagorry. The upper catchment comprises peat covered hills. The landscape of the mid and lower reaches is predominantly agricultural. There are some sand and gravel workings adjacent to the middle reaches of the watercourse. Where the Proposed Scheme crosses the river, north-west of Ballymagorry, the river channel is between 4m and 20m wide and typically transitional in character.
- 2.2.5 The River Finn rises in Lough Finn in County Donegal and flows east for 60km to Strabane, where it joins with the River Mourne. The upper reaches of the catchment, which has an area of 495km<sup>2</sup>, generally flow through mountainous terrain. The route runs along the eastern bank of the lower reaches of the river, which by this point is a mature lowland river, with a wide unconfined valley and floodplain that is relatively deep and slow flowing.
- 2.2.6 The River Mourne forms the middle section of the main spine of the Foyle Catchment and has a catchment area of 1860km<sup>2</sup>. The Mourne is formed at the confluence of the River Strule and River Derg near Ardstraw. The river flows north to Strabane, where it merges with the River Finn to form the River Foyle. The route runs parallel with the western bank of the Mourne. The Mourne is a transitional river with numerous riffle and pool sequences, which flow in a relatively unconfined valley within a large floodplain. The river channel is on average 60m wide and has been heavily modified at Sion Mills, where historically a large weir has been constructed. As the Mourne passes through Strabane the river channel has been modified by various flood defences.
- 2.2.7 The River Derg rises in the Killeter Uplands to the west of the route and flows eastwards to its confluence with the Strule River near Ardstraw. The route crosses the lower reaches of the Derg close to the confluence. The upper reaches of the catchment, which is approximately 440km<sup>2</sup>, are characterised by peatlands, while the lower reaches flow predominantly through farmland. The main stream length of the River Derg is 53km. Within the vicinity of the Proposed Scheme the River Derg is a transitional (piedmont) river characterised by a well-developed valley, reasonably large floodplain and variable substrate with riffle and pool sequences.

- 2.2.8 The River Strule forms the upper section of the main spine of the Foyle Catchment, and has a catchment area of 1340km<sup>2</sup>. The Strule is formed by the confluence of the Camowen and Drumragh rivers in the centre of Omagh. The Strule then flows northwards for approximately 21km before merging with the River Derg to form the Mourne. The entire length of the Strule runs parallel to the route. The Strule has two major tributaries, the Owenkillew which joins the Strule from the east at Newtownstewart and the Fairy Water which joins to the north of Omagh. As the proposed route passes to the west of Newtownstewart the Owenkillew is unlikely to be affected by the proposed road scheme. The route does cross numerous small stream tributaries on the western slopes of the Strule valley. The Strule is a transitional river with variable bed materials, riffle and pool sequences, an unconfined valley and floodplain. The catchment is predominantly agricultural, although peat bog is present in the upper reaches of the large tributaries and sand and gravel quarrying is present in the Strule valley, particularly north of Newtownstewart.
- 2.2.9 The Fairy Water rises on the slopes of Bolaght Mountain in west Tyrone and flows eastwards to its confluence with the River Strule to the north of Omagh. It has a catchment area of 180km<sup>2</sup> and a main stream length of 30km. The catchment is predominantly agricultural grassland; however there are significant areas of peat throughout the catchment, particularly in the valley floor. The Proposed Scheme crosses the Fairy Water approximately 500m upstream of its confluence with the Strule. In this area the river is approximately 16m wide and has typical transitional characteristics with a meandering channel pattern and riffle and pool sequences.
- 2.2.10 The Drumragh River lies in the upper reaches of the Foyle Catchment and is formed to the south of Omagh by the confluence of the Ballynahatty Water and Quiggery Water. It has a catchment area of 321km<sup>2</sup>. The Drumragh flows generally north through the centre of Omagh before merging with the Camowen to become the River Strule. The route crosses the Drumragh approximately 2.5km downstream of the Ballynahatty-Quiggery confluence. At this point the river is approximately 10-15m wide and has typical transitional characteristics with variable bed material, riffle and pool sequences and an unconfined valley and floodplain. Due to the nature of the topography in the Drumragh catchment there is an intricate dendritic drainage network, with a large number of tributary streams. The route skirts around the eastern extent of the upper Drumragh catchment, crossing a number of small streams / large field drains within the Routing Burn and Eskragh Water sub-catchments. Many of the streams have been straightened or otherwise modified, with the exception of the Routing Burn main stream length, which is largely unmodified.

- 2.2.11 The Camowen River rises in the hills to the west of Pomeroy and flows westwards to Omagh, where it joins with the Drumragh to form the River Strule. It has a catchment area of 276km<sup>2</sup>. The Proposed Scheme passes through the western extent of the Camowen watershed, crossing the headwaters of a minor tributary to the Camowen River, namely the Ranelly Drain. These headwaters generally rise in the low lying peatlands which have formed between the drumlins that characterise the area. The reaches that the route pass over range from small semi-natural streams a few metres wide with good flow to very narrow ditches with limited flow.
- 2.2.12 The River Blackwater rises to the west of Fivemiletown and flows eastwards to Aughnacloy then north-east to Lough Neagh. It has a catchment area of 1493km<sup>2</sup>. The Proposed Scheme crosses the eastern part of the Upper Blackwater catchment, passing through the major tributary sub-catchments of the Roughan Burn and Ballygawley River, before terminating on the northern bank of the River Blackwater immediately south of Aughnacloy.
- 2.2.13 The Roughan Burn rises on the southern slopes of Slievemore and flows south through Ballymackilroy before joining the River Blackwater downstream of Augher. It has a catchment of 27.02km<sup>2</sup>. Where the Proposed Route is crossed by the Roughan Burn it is a small, shallow stream with gravel and cobble bed. Although this reach is generally unmodified the lower reaches have been extensively straightened.
- 2.2.14 The Ballygawley Water rises on the slopes of Eshmore Hill approximately 12.5km northeast of Ballygawley. It has a catchment of 53.25km<sup>2</sup>. The river flows through the town before joining the river Blackwater at Lismore Bridge, approximately 6km downstream. The Proposed Scheme crosses the Ballygawley Water approximately 2km downstream of the town. At this point the river is approximately 10m wide with a shallow cobble and gravel bed.

### 2.3 Environmental obligations of the project during construction phase

- 2.3.1 The surface water management plan and pollution prevention measure installed as part of the A5WTC will be constructed using best practice and in conformance with the requirements of NIEA and other relevant governing bodies. The key legislation and guidance which will be adhered to are as follows:
- Water Framework Directive (Directive 2000/60/EC)
  - Water (Northern Ireland) Order 1999
  - Water abstraction and impoundment regulations (licensing) Northern Ireland 2006
  - Groundwater regulations (Northern Ireland) 1998 (as amended)
  - Control of pollution (oil storage) regulations (Northern Ireland) 2010
  - Drainage (Northern Ireland) Order 1973 (as amended)
  - Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009
  - Pollution Prevention Guidance Notes (PPGs):

- PPG01 General guide to the prevention of water pollution
- PPG02 Above ground oil storage tanks
- PPG05 Works in near or liable to affect watercourses
- PPG06 Working at construction and demolition sites
- PPG07 Refueling Facilities
- PPG11 Preventing pollution at industrial sites
- PPG18 Control of spillages and fire fighting run-off
- PPG20 Dewatering underground ducts and chambers
- PPG21 Pollution Incident Response Planning
- PPG23 Maintenance of Structures over Water
- PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers
- CIRIA Report C502 Environmental Good Practice on Site
- CIRIA 521 - Sustainable Urban Drainage Systems; Design Manual for Scotland and Northern Ireland
- CIRIA Report C532 Control of Water Pollution from Construction Sites
- CIRIA Report C648 Control of Pollution from Linear Construction Project. Technical Guidance
- CIRIA Handbook C650 Environmental good practice on site
- CIRIA Handbook C651 Environmental good practice on site checklist
- CIRIA Report C697 - The SUDS Manual

## 2.4 Silt Management

- 2.4.1 Contamination by silt from site run off into adjoining water courses is a key risk for this Project if not properly controlled throughout the construction of the Scheme.
- 2.4.2 Site discharge licences will be required from NIEA prior to works commencing. Any application for such consent must clearly state how site run off will be managed, treated and returned to the water course.
- 2.4.3 Site run off is made up of two components and are the direct results of heavy rain.
- 2.4.4 The first component is run off from adjoining land that is not affected by the works. Run off from adjoining land would be intercepted by the early construction of Pre-earthwork drained ditches (PED). This will be one of the first earthwork operations. Where the new road is in a cutting then the PED would be located at the top of the cut any water entering this ditch would be run off from adjoining land thus would not need treating.
- 2.4.5 The second component is run off across the works once the topsoil strip has been completed, this could be any of the following:
- Run off across topsoil strip

- Run off down embankment cuttings
- Run off down embankments being constructed.

## 2.5 General Construction Policies

- 2.5.1 The Silt Management Plan has been developed to minimise and mitigate for the effects of pollution to all local watercourses. However, this does not remove environmental responsibilities from the contractor / sub-contractors. All site personnel should be made aware of their environmental responsibilities through the production of this Construction Method Statement and an environmental induction.
- 2.5.2 In accordance with BS6031: 1981 Code of Practice for Earth Works, land disturbance will be kept to minimum and disturbed areas will be stabilised as soon as possible. Soil handling will be undertaken with reference to best practice guidelines.
- 2.5.3 In general the following will be adhered to in terms of the general Earthworks:
- All roads will be kept free from dust and mud deposits.
  - Areas of extraction and deposition will be carried out according to BS6031:1981 Code of Practice for Earth Works. Risk assessment will be evaluated to ensure all surface water will be appropriately treated prior to entering a discharge point.
  - Any clean surface water not directly linked to a watercourse will be dealt with in the appropriate manner and field drainage introduced to the nearest stream before work begins.
  - Retention ponds will be dug out first. These retention ponds will form part of the permanent SUDS and will be used during the construction period to deal with any surface water and act as sedimentation control.
  - Trapezoidal-ditches will be dug out where required to channel any surface water from haul roads into these retention ponds. These will be to minimal gradient and if required straw bales or clean stone will be installed to act as weirs.
  - Cut-off drains will be installed around the working areas to intercept uncontaminated surface runoff and divert it around and away from the works; surface water runoff may also be diverted around the excavations using heavy timbers or similar laid on the surface of the ground.

## 2.6 Installation Programme

- 2.6.1 At all times silt management features should be constructed prior to, or at the same time as the construction of the works. Before runoff is allowed to flow through the ditches, or across embankments scrutiny must be given by the contractor that the ditches, ponds slopes and embankments are fully stabilised and will not be affected by erosion. This will prevent the clogging of other parts of the system by the silt that is generated.

## 2.7 Working in the vicinity of water / Buffer zones

- 2.7.1 The following recommendations apply to the general construction activities either with the watercourses or in the vicinity of watercourses:

- Where practicable construction near streams should be avoided in wet weather.
- Keep cement and raw concrete out of watercourses.
- Plan so that roadside drains do not discharge directly into watercourses, but rather through a vegetated buffer area of adequate width.
- Runoff from excavations will NOT be pumped directly to watercourses.
- Should there be any incidents of pollution to the watercourses NIEA should be notified immediately. Immediate steps will be undertaken to resolve the cause of the pollution and where feasible mitigate against the impact of pollution, following the advice set out in PPG21.

## 2.8 Temporary Haul Roads

2.8.1 It is proposed that as the scheme progresses, the finished permanent roads will act as the temporary haul roads during the construction phase.

- Construction activities will be scheduled to minimise the area and period of time that soil will be exposed, particularly during winter periods.
- Cut-off drains will be installed around the working areas to intercept uncontaminated surface runoff and divert it around and away from the works.
- Stockpiling of materials will be minimized and essential stockpiles will be located as far away as possible from watercourses.
- Drains and culverts will be kept clear of debris and silt traps will be maintained appropriately. Spoil will not be dumped within buffer areas.
- Erosion of embankments will be avoided and, where possible, a vegetation cover will be maintained.
- Roads, drains and silt traps will be inspected for damage after intense storms and also before and after any intensive use.
- Site roads and approaches to river crossings will be regularly brushed or scraped and kept free from dust and mud deposits. Rubble slumps will be introduced prior to road crossings.

## 2.9 Settlement Ponds

2.9.1 Where possible, permanent SUDS pond locations will be used during the temporary construction phase to collect silt. At completion of the construction phase the settlement ponds will be fully reinstated to final design requirements.

2.9.2 Site run off will be intercepted by PED and the ditches will feed into temporary balancing ponds. Straw bales will be placed along the length of the ditch to help early removal of silt.

2.9.3 The ponds will be a minimum of 20m x 10m x 3m deep so that the pond can store approximately 500m<sup>3</sup>. The maximum precipitation on a 1 in 75 year rainfall has been used in the storage calculations. An example of the calculations is attached in Appendix C.

- 2.9.4 The strategy is to collect the silt contaminated run off at the temporary pond locations, allow the silt to settle and gravity feed the pond water back into the watercourse.
- 2.9.5 The outlet will be set at a higher level in relation to the inlet so that the pond fills up and allows the silt to settle.
- 2.9.6 Construction waste materials such as generated silts will be disposed of in such a manner that it does not add risk of additional silt load in the construction run-off.
- 2.9.7 Settlement ponds will be inspected for damage after intense storms in particular at the entry point and around the forebay area.
- 2.9.8 In most instances the works will only be affected by normal rain showers and thus operations would stop. Following heavier rainfall events the trace will be allowed to dry before recommencing earthworks operations.
- 2.10 **Exposed Ground and stockpiles**
- 2.10.1 As part of the surface water management plan for the site the following measures have been incorporated for spoil management areas.
- The amount of exposed ground and soil stockpiles will be kept to a minimum.
  - Stockpile which will be in place for an extended period of time will be allowed to re-vegetate naturally.
  - Short term stock piles will be sealed.
  - Cut-off trenches will be installed uphill of spoil management areas to divert flows away from potential sources of silt pollution.
  - Silt fences made from a suitable geotextile material will be used alongside all exposed ground where there is a pollution risk. Areas on a steep gradient will be managed to make sure erosion does not take place and small ditches will be considered around the perimeter.
- 2.11 **Excavations**
- 2.11.1 Every effort will be made to prevent water from entering excavations. Cut off ditches will be used to prevent entry of surface water. Clean runoff within the cut off trenches will be discharged back into the natural drainage system.
- 2.12 **Over Pumping**
- 2.12.1 Over Pumping will be avoided for construction of culverts within this scheme wherever possible.
- 2.12.2 Where over pumping is essential, no direct discharge to the existing watercourse will be permitted. Water from the over pumping operation will pass through a stilling pond and a settlement pond before being discharged to the receiving watercourse.

2.12.3 Any over pumping that may be required for other works such as below ground excavations will be strictly controlled by the on-site Environmental Manager using a 'permit to pump' system and regular monitoring of compliance with control measures.

2.12.4 All pumping operations will ensure that the pumps are sited a minimum of 15m away from the water course, drip trays or lined bunds are used to avoid accidental spillage. Spill kits will be located at the pump locations.

2.12.5 All over pumping would be undertaken using the one of the methods outlined below:

- Water pumped into a silt tank will allow any silt to settle before being gravity fed back into the watercourse downstream of the works back into an approved discharge location.
- Water pumped into the PED which incorporate mitigation measures such as check dams and silt traps which would make its way to a settlement lagoon allowing sediment to settle before water is discharged back into an approved discharge location.

2.12.6 If heavy rain was encountered which could result in flood upstream of the works then over pumping and construction operations will be stopped and the works will be allowed to re-fill with water.

## 2.13 Plant Crossings

2.13.1 In Salmonid catchments, all in stream works will be carried out during the months of May to September inclusive.

2.13.2 In Brook/Sea Lamprey catchments, all in stream works will be carried out during the months of September to March inclusive. It is intended that culverts that are piped in the permanent solution will be piped using the permanent diameter pipe size as a temporary crossing during this 5-7 month timeframe.

2.13.3 Crossing that are required outside of the windows listed above will require a temporary bridge crossing which will span the top bank of the existing watercourse. Precast concrete abutments will be used in order to mitigate the risk of contamination of the watercourse using concrete. The bridge will use steel beams to span the watercourse and precast concrete planks. Details are contained within Appendix D.

## 2.14 Sampling

2.14.1 A programme of water monitoring will be carried out during the construction phase. The extent and frequency of the monitoring will be proportionate to the level of activity. Such monitoring will be required in order to:

- Demonstrate that the mitigation measures and surface water management plan is performing as designed;
- Provide reassurance that the in-place mitigation measures are not having a significant impact upon the environment;

- Indicate whether further investigation is required and, where any risks are unacceptable, the need for additional mitigation measures to prevent, reduce or remove any impacts on the water environment.

2.14.2 This monitoring will commence prior to the start of work activities to establish the baseline conditions at each work site.

2.14.3 The surface water-monitoring programme will be site-specific and tailored to provide a meaningful and pragmatic indication of the state of the water environment. Given the nature of the development, it is considered that the surface water monitoring programme will comprise:

- An initial site walkover to establish base line conditions and identify watercourses which are presently polluted from silt deposition or any other waterborne pollutants.
- Regular visual inspections of surface water management features, such as culverts and receiving watercourses, in order to establish whether there is increased erosion or deposition and sediment.
- Regular visual inspections of watercourses during construction and decommissioning stages, particularly during periods of high rainfall, in order to establish that levels of suspended solids have not been increased by site activities.
- Periodic and ad-hoc sampling of surface waters and private water supplies in order to complement the programme of visual inspection.
- Additional monitoring required as a condition of discharge consents, abstraction licences or other environmental regulation.

2.14.4 All subsequent monitoring results will be compared with the baseline data-set to identify any impacts of the development on the surface water environment and to identify the requirement for any appropriate remedial measures. The impacts of the development will be deemed acceptable if there is no significant net deviation from the baseline monitoring results.

### 3 Flood Defences

- 3.1.1 For works that affect any existing flood defences a secondary defence will be constructed prior to the removal of the existing defence.
- 3.1.2 No works will be allowed to take place that affects flood defences without prior approval from the Rivers Agency and NIEA.

## 4 Monthly Reporting

- 4.1.1 NIEA, Rivers Agency and Loughs Agency are all key stakeholder on this project and will be part of the monthly stake holder meetings. These meetings will review the last months work, discuss the following months works and discuss and lessons learnt. As part of this forum contractors will submit their monthly work schedule, two monthly rolling programme which clearly show the works areas for the following month their anticipated discharge rates. These will be based on the works area affected and the potential of a 1 in 75 year storm event happening.

## Appendices

## Appendix A – Scheme Alignment

## Appendix B – Example Watercourse Crossing Construction Method Statement

## Appendix C – Example Temporary Retention Pond Calculations

## Appendix D – Watercourse Haul Road Crossing Details