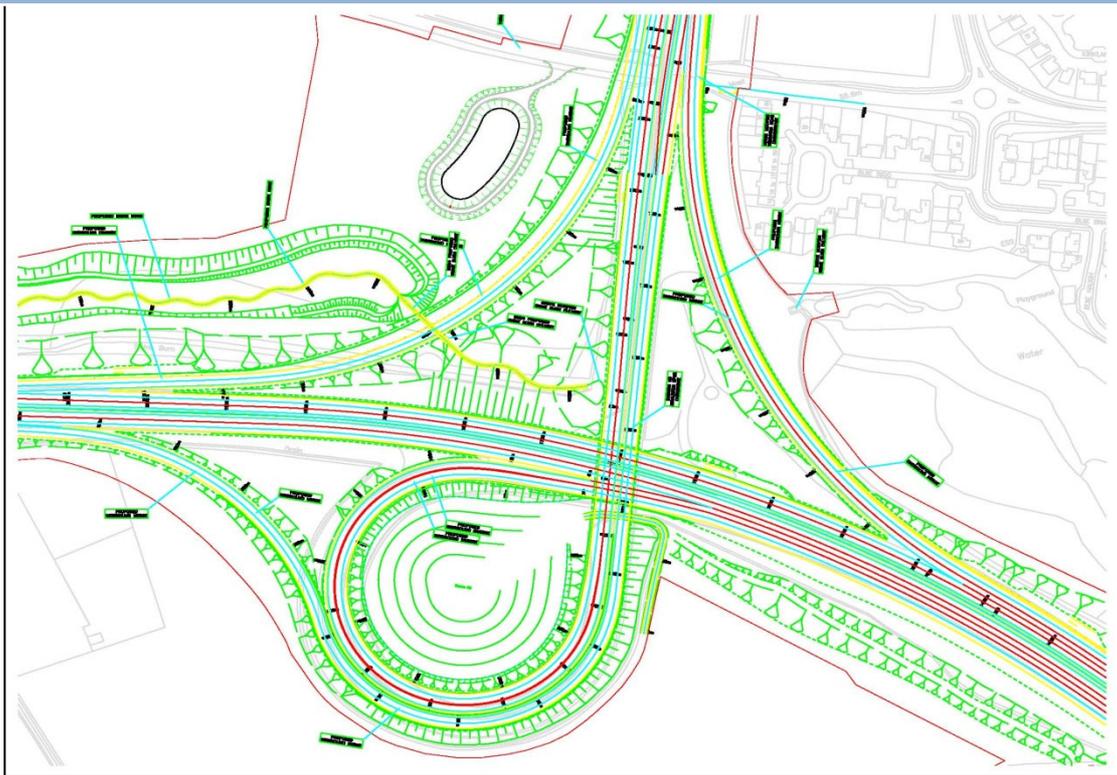




FORTH REPLACEMENT CROSSING M9 Junction 1a – Project Quality Plan: Volume 4 SURFACE WATER MANAGEMENT PLAN



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Revision Record

Rev	Date	By	Summary of Changes	Chkd	Aprvd
01	18th September 2011	RT	Reflect EDT, Statutory Bodies and Local Authorities Consultations and Review	SOB	SOB
02	14 th March	RT	Title and contents amended to reflect SRB and EDT review	SOB	SOB

Surface Water Management Plan**Objective:**

To comply with 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.

Introduction:

This Surface Water Management Plan has been produced as required by the CoCP, Section 9 by SRB. It includes details of controls to prevent contamination of surface water and

groundwater resources, together with monitoring systems to be employed during the construction works and emergency procedures to be implemented in the case of any pollution incidents.

This plan has been produced as part of the Construction Environmental Management Plan (CEMP) and takes account of the commitments and requirements as detailed in the following documents:

- Forth Crossing Bill Commitments and Undertakings;
- Code of Construction Practice (CoCP), Revision 1, May 2010;
- Outline Construction Environmental Management Plan (CEMP), Revision 0, December 2010;
- Employers Requirements, contract issue;
- Environmental Statement (ES) 2009;
- Water Environment (Controlled Activities)(Scotland) Regulations 2011;
- Water Environment (Oil Storage) (Scotland) Regulations 2006 and
- Food and Environment Protection Act 1985.

Key Issues:

The following watercourses are contained within the M9 Junction 1A project.

Groundwater:

There is potential for pollution of groundwater during the Project. The potential effect on groundwater is covered in the Geology, Land Contamination and Site Waste Management Plan.

Swine Burn:

The Swine Burn has a catchment area of 10km² and is a tributary of the River Almond. The watercourse, which is approximately 8km in length, flows in a south-easterly direction through a predominantly rural catchment which includes agricultural land and mixed and broadleaf woodland.

SEPA advised in January 2009 that Swine Burn is identified as WFD (2006/60/EC) risk status 1a (significantly at risk) and receives anthropogenic pressure from point sources of pollution, as well as realignments related to construction of the M9 and M9 Spur.

Water Quality: Swine Burn is classified under SEPA's water quality classification scheme as Class A2 (good) apart from a localised downgraded stretch of Class C (poor) upstream of its confluence with the River Almond in the vicinity of the distillery. The watercourse is a key tributary of the River Almond which is designated as a salmonid fishery river and in addition to the pressures highlighted above, is considered likely to receive anthropogenic pressure from agriculture and road drainage.

Swine Burn is considered to be of medium environmental importance and has been assigned a medium sensitivity for water quality.

Tributary of Swine Burn:

This short watercourse originates in Ross's Plantation to the west of the M9 near Charles Bridge. The tributary is crossed by the M9 downstream of the Charles Bridge culvert and discharges into the main stem of the Swine Burn approximately 50m north of this culvert.

Water Quality: The tributary of the Swine Burn is not classified under SEPA's classification scheme and no spot sampling was undertaken during the ES study. This small watercourse acts predominantly as a drainage channel and is considered likely to receive anthropogenic pressure

from agriculture, forestry and road drainage. It does not support any designated water-dependent ecosystems.

The tributary of Swine Burn is considered to be of local or low environmental importance and has been assigned a low sensitivity for water quality.

Niddry Burn:

Niddry Burn located to the west of Kirkliston, is a tributary of the River Almond. It is approximately 7km in length and has a catchment area of 20.64km². The catchment has a predominantly rural land use.

SEPA advised in May 2008 that Niddry Burn is identified as WFD (2006/60/EC) risk status 1a (significantly at risk) and receives anthropogenic pressure from diffuse sources of pollution (mixed farming) and point sources of pollution (sewage disposal), as well as morphological alterations caused by historical straightening of the watercourse. SEPA advised in January 2009 that Niddry Burn has a draft WFD (2006/60/EC) status of moderate.

Water Quality: Niddry Burn is classified under SEPA's water quality classification scheme as Class B (fair). However, it is included in the designation with the River Almond as proposed salmonid waters under the Freshwater Fisheries Directive (2006/44/EC). As well as the pressures highlighted above, the watercourse is also considered likely to receive anthropogenic pressure from agriculture and road drainage.

Niddry Burn is considered to be of high importance and has been assigned a high sensitivity for water quality.

Tributary of Niddry Burn:

The tributary of Niddry Burn originates at NGR NT 0980 7350 and is approximately 2.5km in length, draining a small catchment. The watercourse flows in an easterly direction past Newliston through two online ponds impounded by weirs near Newliston House before crossing the M9 and finally discharging into Niddry Burn approximately 180m upstream of the Niddry Burn and River Almond confluence. SEPA confirmed in March 2009 that this impoundment is authorised under CAR. The ponds are associated with Newliston House and appear to be ornamental features.

Water Quality: This tributary of Niddry Burn is not classified under SEPA's water quality classification scheme. Spot sampling undertaken just upstream of the confluence with Niddry Burn by Jacobs ARUP in 2008 suggest excellent (A1) dissolved oxygen (DO) and pH levels. However, the small burn, acting predominantly as a field drainage channel, is considered likely to receive anthropogenic pressure from agricultural activities and road drainage. It does not support any designated water-dependant ecosystems.

The tributary is considered to be of local or low environmental importance and has been assigned a low sensitivity for water quality.

River Almond:

The River Almond is the largest watercourse near the proposed scheme, approximately 50km long, rising in the Cant Hills above Harthill and draining to the Firth of Forth at Cramond. It has a catchment area of approximately 388km² and receives flow from the Niddry Burn and Swine Burn.

- The watercourse is identified as WFD (2006/60/EC) risk status 1a (significantly at risk).

SEPA advised in January 2009 that the River Almond in the location of the proposed scheme has a draft WFD (2006/60/EC) status of poor.

Water Quality: The watercourse is classified under SEPA's water quality classification scheme as Class B (fair) upstream and in the vicinity of the proposed scheme, downgrading to Class C (poor) from Hallyards to the Firth of Forth. SEPA advised in March 2009 that in the vicinity of the

proposed scheme there is a licensed point source discharge of treated sewage effluent from Breastmill to the south of Kirkliston, outfalling at NGR NT 1233 7379. The River Almond is designated as proposed salmonid waters under the Freshwater Fisheries Directive (FWFD: 2006/44/EC), and is designated as a Site of Importance for Nature Conservation (SINC) at county/authority level. Fish species of conservation concern have been recorded in the watercourse, including Atlantic salmon, sea trout and brown trout.

The River Almond is considered to be of high environmental importance and has been assigned a high sensitivity for water quality.

Sensitivity of Surface Water Features for the Proposed Scheme:

Watercourse	Discipline	Sensitivity
Swine Burn	Hydrology and Flood Risk	Medium
	Fluvial Geomorphology	Medium
	Water Quality	Medium
Tributary of Swine Burn	Hydrology and Flood Risk	Low
	Fluvial Geomorphology	Low
	Water Quality	Low
Niddry Burn	Hydrology and Flood Risk	Medium
	Fluvial Geomorphology	Medium
	Water Quality	High
Tributary of Niddry Burn	Hydrology and Flood Risk	Low
	Fluvial Geomorphology	Low
	Water Quality	Low
River Almond	Hydrology and Flood Risk	High
	Fluvial Geomorphology	Medium
	Water Quality	High

Summary of Potential Impacts on Waterbodies:

Water Feature	Sensitivity	Source of Impact	Impact Description Summary	Potential Impact (Unmitigated)	
				Magnitude	Significance
Swine Burn	Hydrology/Flood Risk: Medium Fluvial Geomorphology: Medium Water Quality: Medium	General construction works and road operation in catchment Crossing 1 new culvert ch245 (Interchange Link) (approximately 50m) 1 culvert extension ch730 (M9 Spur) (total 164m) Realignment Upstream of new culvert CH2165 – CH1840 (M9) (451m)	<u>Construction</u> <ul style="list-style-type: none"> Hydrology/Flood Risk: Temporary construction structures placed within flood risk zones or for flow diversion of Swine Burn may temporarily increase flood risk locally and be susceptible to flood damage. Temporary increase in hardstanding areas resulting in temporary increases in runoff into Swine Burn. Fluvial Geomorphology: Proposals, including the requirement for in-channel works, could substantially increase the supply of sediment downstream which may lead to smothering of the channel bed and a reduction in channel morphology. Water Quality: Potential sediment release and risk of accidental spillage of pollutants due to construction works in or adjacent to the watercourse and close proximity of site compound to watercourse. 	Hydrology/Flood Risk: Medium Geomorphology: High Water Quality: High	Hydrology/Flood Risk: Moderate Geomorphology: Moderate/ Substantial Water Quality: Moderate/ Substantial
Tributary of Swine Burn	Hydrology /Flood Risk: Low Fluvial Geomorphology: Low Water Quality: Low	General construction works and road operation in catchment Road Outfall 1 outfall: Run B ch2180 – ch2500 (new drainage area: 0.66ha)	<u>Construction</u> <ul style="list-style-type: none"> Hydrology/Flood Risk: Temporary construction works for SUDS system within catchment may slightly increase peak flow rates into the watercourse. Temporary increase in hard standing areas resulting in temporary increases in runoff into Tributary of Swine Burn. Fluvial Geomorphology: Outfall construction could lead to release of sediment and deposition downstream which 	Hydrology/Flood Risk: Low Geomorphology: Low Water Quality: Low	Hydrology/Flood Risk: Negligible Geomorphology: Negligible Water Quality: Negligible

			<p>may cause a reduction in morphological diversity.</p> <ul style="list-style-type: none"> Water Quality: Potential sediment release and risk of accidental spillage of pollutants due to construction works in or adjacent to watercourse 		
Niddry Burn	<p>Hydrology/Flood Risk: Medium</p> <p>Fluvial Geomorphology: Medium</p> <p>Water Quality: High</p>	<p>General construction works and road operation in catchment</p> <p>Crossing 1 culvert extension ch1120 (M9) (total 95.6m)</p> <p>Road Outfall 1 outfall: • Run C ch1290 – ch2200 (new drainage area: 4.42ha)</p>	<p><u>Construction</u></p> <ul style="list-style-type: none"> Hydrology/Flood Risk: Temporary construction structures placed within flood risk zone or for flow diversion of Niddry Burn may temporarily increase flood risk locally and be susceptible to flood damage. Temporary increase in hardstanding areas resulting in temporary increases in runoff into Niddry Burn. Fluvial Geomorphology: Construction works could increase the supply of sediment downstream which may lead to smothering of the channel bed and a reduction in channel morphology. Water Quality: Potential sediment release and risk of accidental spillage of pollutants due to construction works in or adjacent to watercourse. 	<p>Hydrology/Flood Risk: Medium</p> <p>Geomorphology: Low</p> <p>Water Quality: Medium</p>	<p>Hydrology/Flood Risk: Moderate</p> <p>Geomorphology: Slight</p> <p>Water Quality: Moderate/ Substantial</p>
Tributary of Niddry Burn	<p>Hydrology/Flood Risk: Low</p> <p>Fluvial Geomorphology: Low</p> <p>Water Quality: Low</p>	<p>General construction works and road operation in catchment</p> <p>Crossing 1 culvert extension ch880 (M9) (total 62m)</p>	<p><u>Construction</u></p> <ul style="list-style-type: none"> Hydrology/Flood Risk: Potential culvert extension and embankment widening would increase flood risk upstream as it would encroach onto floodplain. Temporary increase in hardstanding areas resulting in temporary increases in runoff into Tributary of Niddry Burn. Fluvial Geomorphology: Construction works could increase the supply of sediment downstream which may lead to smothering of the channel bed and a reduction in channel 	<p>Hydrology/Flood Risk: Low</p> <p>Geomorphology: Low</p> <p>Water Quality: Medium</p>	<p>Hydrology/Flood Risk: Negligible</p> <p>Geomorphology: Negligible</p> <p>Water Quality: Slight</p>

			<p>morphology.</p> <ul style="list-style-type: none"> Water Quality: Potential sediment release and risk of accidental spillage of pollutants due to construction works in or adjacent to watercourse. 		
River Almond	<p>Hydrology/Flood Risk: High</p> <p>Fluvial Geomorphology: Medium</p> <p>Water Quality: High</p>	<p>General construction works and road operation in catchment</p> <p>Road Outfall 1 outfall: • Run D ch690 – ch1290 (new drainage area: 2.57ha)</p>	<p><u>Construction</u></p> <ul style="list-style-type: none"> Hydrology/Flood Risk: Temporary increase in hardstanding areas resulting in temporary increases in runoff into receiving waterbodies which discharge into the River Almond. Temporary displacement of flood waters due to construction works placed within the River Almond floodplain. Fluvial Geomorphology: Outfall construction could lead to release of sediment and deposition downstream which may cause a reduction in morphological diversity. Water Quality: Potential sediment release and risk of accidental spillage of pollutants due to construction works in or adjacent to watercourse 	<p>Hydrology/Flood Risk: Low</p> <p>Geomorphology: Negligible</p> <p>Water Quality: Medium</p>	<p>Hydrology/Flood Risk: Slight</p> <p>Geomorphology: Negligible</p> <p>Water Quality: Moderate/ Substantial</p>

Management & Mitigation(to be read in conjunction with the Pollution Incidence Response Plan:

Location	Mitigation Measures
Throughout Scheme	SEPA Pollution Prevention Guidelines - PPG01, PPG02, PPG03,PPG04, PPG05, PPG06, PPG07, PPG08, PPG10, PPG13, PPG14, PPG18, PPG20, PPG21, PPG22, and PPG26; CIRIA Guidelines Report 142 Control of Pollution from Highway Drainage Discharges; CIRIA Report 168 Culvert Design Guide; CIRIA C609 Sustainable Drainage Systems; CIRIA C648 Control of Water Pollution from Linear Construction Projects; CIRIA C649 Control of Water Pollution from Linear Construction Projects Site Guide; CIRIA C697 The SUDS Manual; BS6031:1981 Code of Practice for Earthworks; and Defra Code of Practice for Using Plant Protection Products.
Throughout Scheme	An Environmental Manager will be present on site during construction to supervise the implementation of appropriate environmental safeguards.
Throughout Scheme	The Permanent attenuation ponds will be constructed as early as practicable to provide attenuation for runoff from the construction areas. Where this is not possible / practicable, temporary attenuation will be provided to reduce the pollution from runoff during the construction of approach roads
Throughout Scheme	To reduce potential increases in flows into the receiving watercourses during construction, the period of exposure of bare areas and uncontrolled runoff from newly paved areas will be limited as far as practicable
Throughout Scheme	Stationary oil storage tanks will be located above the 0.5% AEP (1 in 200-year return period) flood level. Plant and material will be stored in safe areas above the 0.5% AEP (1 in 200 year return period), where practicable and temporary construction works will aim to be resistant to flood impacts in order to prevent movement or damage during potential flooding events.
Throughout Scheme	SRB will be required to prepare a method statement for in-stream working for approval by SEPA.
Throughout Scheme	Temporary drainage systems will be used to alleviate localised flood risk and prevent obstruction of surface runoff pathways. Temporary SUDS systems or equivalent to reduce the potential for contaminated runoff to watercourses will be implemented.
Throughout Scheme	General Binding Rule (GBR) 10 of CAR requires construction sites to be served by a sustainable drainage system, or equivalent, equipped to avoid pollution of the water environment. During construction of the site, temporary SUDS systems or equivalent to reduce the potential for contaminated runoff to watercourses will be implemented.
Throughout Scheme	If flocculants are considered necessary to aid settlement of fine suspended solids such as clay particles, the chemicals used must first be approved by SEPA
Throughout Scheme	Where required, temporary discharge consents are to be obtained from SEPA and oil interceptor(s) to be provided for vehicle parking areas, if required by SEPA.
Throughout Scheme	Materials for use in fill e.g. in embankments should comply with best practice. Where the Contractor considers the use of other materials, agreement with SEPA is required prior to use of such material
Throughout Scheme	Effective mitigation for impacts associated with outfalls will be based on the following principles: <ul style="list-style-type: none"> • construction of outfalls will not to be conducted during periods of high flow (as determined by the Environmental Clerk of Works) in order to reduce the risk of scour and erosion around the outfall structures or to the disturbed river bank; • where practicable, sediment fences will be provided to prevent sediment being washed into the watercourses; and • where practicable, excavating into the watercourse will be avoided and the extent of disturbance limited.
Throughout Scheme	Service diversions, protection of utilities, excavations and ground penetration works will be carried out according to best practice. Potential services will be identified using information from the service provider and through survey where necessary. Measures are to be taken to prevent damage to services and to avoid pollution during service

	diversions, excavation and ground penetration.
Throughout Scheme	Best practice measures associated with storage of oil and fuels will be adhered to.
Throughout Scheme	The impact of the proposed scheme can be reduced through timely implementation of certain aspects of the construction works. Reasonable precautions will be taken to develop a programme to facilitate the implementation of mitigation measures at the stage where their application will be most effective.
Throughout Scheme	For all watercourses, in-channel works will be carried out during periods of low flow (as determined by the Environmental Clerk of Works) to reduce the risk of a pollution event. The length of channel disturbed will be restricted to the minimum that is required. All in-channel works and construction activities within the floodplain will be avoided during periods of high flow and increased flood risk for health and safety reasons. In-channel works will avoid spawning periods in salmonid watercourses, i.e. Niddry Burn, Swine Burn and the River Almond (between October and May) unless otherwise agreed with SEPA and following ecological survey of the relevant watercourse. Tie-ins back to existing channels during culvert realignment works will be undertaken during low flow conditions.
Throughout Scheme	SRB will comply with CAR and SEPA requirements
Throughout Scheme	SRB will be required to monitor water quality prior to and during construction in order to assess chemical and biological parameters as required by SEPA. Parameters, frequency of sampling and limits will be agreed with SEPA in advance of construction.
Throughout Scheme	A daily inspection is to be carried out by the Environmental Manager to identify: <ul style="list-style-type: none"> any pollution risks that are unacceptably high; spillages and leakages; non-compliance with the CoCP; and any suspected incidences of pollution. The Environmental Manager will recommend appropriate actions where risks are unacceptably high, where there is non-compliance with the CoCP, where spillages and leakages are unacceptable or where there are any suspected pollution incidences. Where necessary, the Pollution Incident Response Procedure is to be implemented
Throughout Scheme	SRB will take reasonable precautions to reduce the risk of pollution to the environment including: <ul style="list-style-type: none"> compliance with PPG14; compliance with the requirements of the Food and Environmental Protection Act FEPA licence(s)
Throughout Scheme	For each outfall, a treatment train will be provided to maximise pollutant removal. For new sections of road and roads to be upgraded, the treatment train will consist of 3 levels of SUDS in accordance with CIRIA (2007) and approved by SEPA, including filter drains, swales and detention basins
Throughout Scheme	Provision of mobile spill kits in all supervisors vehicles and in selected machinery including rock breaking plant and mobile fuel bowser. Provision of large spill kit in Environmental Managers vehicle, Site Compound and alongside the River Niddry (South Culvert)
Tributary of Niddry Burn, Niddry Burn, Swine Burn, River Almond	Where structures or embankments are constructed within the floodplain, compensatory storage will be created by landforming and this will be provided directly adjacent to the watercourse floodplain where practicable.
Swine Burn	Two outfalls appropriately positioned with scour protection will be provided. Two treatment trains will be provided. For flood flows in excess of carriageway drainage capacity, detention or conveyance of flood water towards areas of less risk.
Swine Burn	One new depressed invert culvert and one double-barrel culvert extension will be provided. The culvert will be designed in line with CIRIA 168 guidance and with allowance for freeboard above the 0.5% AEP (200-year return period event) flood level and mammal underpass. Regular inspection to ensure the culverts are free from debris is recommended.

Swine Burn	Two stage channel with sinuous flow channel will be provided. An adequately sized floodplain channel within the realignment will be provided to compensate for encroachment of the floodplain by the new proposed crossing and the culvert extension if required. In-channel works will avoid spawning periods in salmonid watercourses, i.e. Niddry Burn, Swine Burn and the River Almond (between October and May) unless otherwise agreed with SEPA and following environmental surveys. Tie-ins back to existing channels during culvert realignment works will be undertaken during low flow conditions.
Tributary of Swine Burn	One treatment train will be provided
Niddry Burn	One treatment train will be provided
Niddry Burn	Culvert extension maintaining same form as existing culvert will be provided. Existing and new channel will be fitted with a mammal ledge to be agreed with the EDT.
Tributary of Niddry Burn	Culvert extension maintaining same form as existing culvert will be provided
River Almond	One treatment train will be provided

Monitoring:

SRB have consulted with SEPA regarding water quality monitoring to be undertaken for watercourses that will be affected by construction works or discharge of surface water run-off, which will include the following, as appropriate:

- Pre-construction monitoring to establish baseline water quality conditions for watercourses
- Daily and Weekly Monitoring during construction works, as detailed in Section to enable the effectiveness of mitigation measures to limit pollution risk to be monitored and any pollution incidents to be identified (see Appendix D of the CEMP – Daily and Weekly Site Inspection Sheet)
- Monitoring of watercourses receiving surface water runoff during construction to enable the effectiveness of treatment and other SUDs measures to be determined.
- Monitoring of over-pumping arrangements at the Swine Burn, Niddry Burn and Niddry Burn Tributary will be undertaken daily and recorded (see Appendix D of the CEMP – Daily and Weekly Site Inspection Sheet)

SRB Propose to carry out the following activities on a weekly basis for each watercourse affected by the works:

- Monthly Suspended Solids Readings from sampling locations upstream and downstream of each works discharge point including:
 - **Swine Burn**
 - **Niddry Burn**
 - **Tributary of Niddry Burn**

SRB will carry out appropriate monitoring to identify:

- Pollution risks that are unacceptably high;
- Spillages and leakages;
- Non-compliance with the CoCP; and

- Suspected pollution incidences.

Regular review of water quality monitoring results will be included in the site internal auditing system and site environmental inspections will include visual inspection of watercourses as detailed in Section 4.5.1.

References

- BS 6031:1981 Code of Practice for Earthworks, British Standards Institution
- CIRIA C648 Control of water pollution from linear construction projects, 2006
- CIRIA C532 Control of water pollution from construction sites. Guidance for consultants and contractors, 2001
- CIRIA C697 The SUDS Manual, 2007
- CIRIA C698 Site Handbook for the Construction of SUDS, 2007
- Code of Practice for Installers, Owners and Operators of Underground Storage Tanks (& Pipelines), Scottish Environment Protection Agency, 2006
- Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods, Scottish Environment Protection Agency, 2009
- Food and Environment Protection Act 1985
- PPG 1: General Guide to prevention of pollution, Scottish Environment Protection Agency
- PPG 2: Above ground oil storage tanks, Scottish Environment Protection Agency
- PPG 3: Use and design of oil separators in surface water drainage systems, Scottish Environment Protection Agency
- PPG 4: Treatment and disposal of sewage where no foul sewer is available, Scottish Environment Protection Agency
- PPG 5: Works and maintenance in or near water, Scottish Environment Protection Agency
- PPG 6: Working at construction and demolition sites, Scottish Environment Protection Agency
- PPG 7: Refuelling facilities, Scottish Environment Protection Agency
- PPG 8: Safe storage and disposal of used oils, Scottish Environment Protection Agency
- PPG 13: Vehicle washing and cleaning, Scottish Environment Protection Agency
- PPG 18: Managing fire water and major spillages, Scottish Environment Protection Agency
- PPG 20: Dewatering underground ducts and chambers, Scottish Environment Protection Agency
- PPG 21: Pollution Incident Response Planning, Scottish Environment Protection Agency
- PPG 22: Dealing with spillages on highways, Scottish Environment Protection Agency
- PPG 26: Storage and handling of drums and intermediate bulk containers, Scottish Environment Protection Agency
- The Water Environment (Controlled Activities) (Scotland) Regulations 2005, as amended
- The Water Environment (Controlled Activities) (Scotland) Regulations 2005: A Practical Guide, Scottish Environment Protection Agency
- The Water Environment (Oil Storage) (Scotland) Regulations 2006
- Food and Environment Protection Act 1985
- Water Environment and Water Services (Scotland) Act 2003
- General Requirements of the CoCP