13 Road Drainage and the Water Environment

13.1 Introduction

This section details the assessment for the road drainage and water environment elements of the proposed scheme. It investigates the potential impacts on road drainage, surface water, groundwater, flood risk and accidental spillage.

An assessment of impacts on road drainage and the water environment during the construction phase is undertaken in Chapter 15 (Disruption Due to Construction).

Potential impacts relating to fish and other species that inhabit the water environment are discussed in Chapter 8 (Ecology and Nature Conservation).

13.2 Methods

13.2.1 Baseline Methods

Areas of road drainage and water environment importance have been identified from the results of a desk study and from consultations with the Scottish Environment Protection Agency (SEPA).

A plan of the study area showing the locations of the watercourses is provided in Figure 13.1 (Drainage Relief Plan).

13.2.2 Impact Assessment Methods

This assessment has been carried out using the guidelines set out in HA216/06 (May 2006), Part 10, Volume 11 of the DMRB and the procedures set out in CIRIA Report 142. Reference has also been made to PAN 58 - Environmental Impact Assessment.

As outlined in Chapter 3 (Approach and Methods), road drainage and water environment impacts were considered in terms of the importance of the water environment attribute (defined in Table 13.1) and the magnitude of impact (defined in Table 13.2). The significance of potential impacts on the attribute was then established through a combination of these factors as detailed in Table 13.3 below.

Importance of Water Environment Attribute

The importance of each water environment attribute was determined following the criteria detailed in Table 13.1 below.

Table 13.1. Criteria for Estimating the Importance of Water Environment Attributes.

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale.	**Surface Water:** EC Designated Salmonid/Cyprinid fishery. SEPA River Classification Scheme Class A1. Site protected under EU or UK wildlife legislation (Special Areas of Conservation (SAC including candidate sites), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI), Ramsar site). **Groundwater:** Major aquifer providing a regionally important resource or supporting site protected under wildlife legislation. Source Protection Zone (SPZ) I. **Flood Risk:** Flood plain or defence protecting more than 100 residential properties from flooding
High	Attribute has a high quality and rarity on local scale.	**Surface Water:** SEPA River Classification Scheme Class A2. Major Cyprinid Fishery. Species protected under EU or UK wildlife legislation. **Groundwater:** Major aquifer providing locally important resource or supporting river ecosystem. SPZ II. **Flood Risk:** Flood plain or defence protecting between 11 and 100 residential properties or industrial properties from flooding.
Medium	Attribute has a medium quality and rarity on local scale.	**Surface Water:** SEPA River Classification Scheme Class B/C. **Groundwater:** Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ III **Flood Risk:** Flood plain or defence protecting 10 or fewer industrial properties from flooding.
Low	Attribute has a low quality and rarity on local scale.	**Surface Water:** RQO River Ecosystem Class RE5. SEPA River Classification Scheme Class D. **Groundwater:** Non-aquifer. **Flood Risk:** Flood plain with limited constraints and a low probability of flooding of residential and industrial properties.

Magnitude of an Impact on an Attribute

The magnitude of impact on each attribute was determined following the criteria detailed in Table 13.2 below.

Table 13.2. Criteria for Estimating the Magnitude of an Impact on an Attribute.

Magnitude	Criteria	Typical Example
Major Adverse	Results in loss of attribute and/or quality and integrity of the attribute.	**Surface Water:** Potential high risk in Method A (HA216/06 Annex I) and potential failure of Total Zinc and Dissolved Copper in Method B. Calculated risk of pollution from an accidental spillage > 2% annually (Method D HA216/06 Annex I). Loss or extensive change to a fishery. Loss or extensive change to a Nature Conservation Site. **Groundwater:** Loss of an aquifer. Potential high risk in Method C (HA216/06 Annex I) of pollution to groundwater from routine runoff - risk score > 250. Calculated risk of pollution from accidental spillages > 2% annually (Method D HA216/06 Annex I). **Flood Risk:** Increase in peak flood level (1% annual probability) > 100mm (Methods E & F HA216/06 Annex I).
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute.	**Surface Water:** Potential high risk in Method A (HA216/06 Annex I) and either potential failure of Total Zinc or Dissolved Copper in Method B. Calculated risk of pollution from an accidental spillage > 1% annually and < 2% annually (Method D HA216/06 Annex I). Partial loss in productivity of a fishery. **Groundwater:** Partial loss or change to an aquifer. Potential medium risk, in Method C (HA216/06 Annex I), of pollution to groundwater from routine runoff – risk score 150-250. Calculated risk of pollution from accidental spillages > 1% annually and < 2% annually (Method D HA216/06 Annex I). **Flood Risk:** Increase in peak flood level (1% annual probability) > 50mm (Methods E & F HA216/06 Annex I).
Minor Adverse	Results in some measurable change in attribute quality or vulnerability.	**Surface Water:** Potential high risk in Method A (HA216/06 Annex I) and no change in Total Zinc and Dissolved Copper in Method B (HA216/06 Annex I). Calculated risk of pollution from accidental spillages > 0.5% annually and < 1% annually (Method D HA216/06 Annex I). **Groundwater:** Potential low risk, in Method C (HA216/06 Annex I), of pollution to groundwater from routine runoff - risk score <150. Calculated risk of pollution from accidental spillages > 0.5% annually and < 1% annually (Method D HA216/06 Annex I). **Flood Risk:** Increase in peak flood level (1% annual probability) > 10mm (Methods E & F HA216/06

Magnitude	Criteria	Typical Example
		Annex I).
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	The proposed scheme is unlikely to affect the integrity of the water environment. **Surface Water:** Low risk in Method A (HA216/06 Annex I) and risk of pollution from accidental spillages < 0.5%. **Groundwater:** No measurable impact upon an aquifer and risk of pollution from accidental spillages < 0.5%. **Flood Risk:** Negligible change in peak flood level (1% annual probability) < +/- 10mm.
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.	**Surface Water:** Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually) (Method D HA216/06 Annex I). **Groundwater:** Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually) (Method D HA216/06 Annex I). **Flood Risk:** Reduction in peak flood level (1% annual probability) > 10mm (Methods E & F HA216/06 Annex I).
Moderate Beneficial	Results in moderate improvement of attribute quality.	**Surface Water:** Calculated reduction in existing spillage by 50% or more (when existing spillage risk > 1% annually) (Method D HA216/06 Annex I). **Groundwater:** Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually) (Method D HA216/06 Annex I). **Flood Risk:** Reduction in peak flood level (1% annual probability) > 50mm (Methods E & F HA216/06 Annex I).
Major Beneficial	Results in major improvement of attribute quality.	**Surface Water:** Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. **Groundwater:** Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. **Flood Risk:** Reduction in peak flood level (1% annual probability) > 100mm (Methods E & F HA216/06 Annex I).

Impact Significance

The significance of impact (beneficial or adverse) was determined as a combination of the importance of the site and the magnitude of impact using the matrix shown in Table 13.3 below.

Table 13.3. Criteria for Estimating the Significance of Potential Effects.

		SIGNIFICANCE OF POTENTIAL EFFECTS			
IMPORTANCE OF ATTRIBUTE	Very High	Neutral	Moderate/Large	Large/Very Large	Very Large
	High	Neutral	Slight/Moderate	Moderate/Large	Large/Very Large
	Medium	Neutral	Slight	Moderate	Large
	Low	Neutral	Neutral	Slight	Slight/Moderate
		Negligible	Minor	Moderate	Major
		MAGNITUDE OF IMPACT			

13.3 Baseline Conditions

13.3.1 Road Drainage

Amey Highways, in their role as Management Agent for Transport Scotland, has indicated that there are no records held for road drainage on the section of A68 between Pathhead and Fala Tunnel. From site inspection it is evident that there is a positive drainage system (direct piped system of kerbs and gullies) along the entire length of the scheme. On further inspection, it appears that the drainage from Hope to the Tynehead junction outfalls into Salters Burn, while the drainage from the Tynehead junction to Fala Tunnel outfalls into the Cakemuir Burn.

The current drainage regime:-

- provides minimal treatment of pollutants normally found in carriageway runoff;
- provides minimal control of surface water runoff rates; and
- does not provide accidental spillage containment.

The existing drainage systems are potentially affecting the baseline water quality of the Salters Burn and the Cakemuir Burn. They may also be affecting groundwater attributes.

13.3.2 Surface Water

There are two main watercourses within the vicinity of the proposed scheme.

Salters Burn commences on the west side of the A68 and flows in a generally north easterly direction, crossing to the east of the A68 just north of the U77 Fala Dam junction via a culvert. Approximately 3.5km downstream of the A68 crossing point it joins the East Water, which then becomes the Keith Water.

SEPA are responsible for the monitoring of water quality and as such they have advised that the River Water Quality Classification of the Keith Water is A1 (excellent quality) and that the Salters Burns is assumed to be of the same quality. SEPA have not previously determined the status of Salters Burn in relation to the Water Framework Directive criteria, but suggests that given the high water quality and the remoteness of the watercourses from population centres it may be assumed that this is of high status.

The other main watercourse is the Cakemuir Burn, which flows beneath the A68 at the southern tie-in of the scheme at Fala Tunnel. Approximately 1km downstream of the A68 crossing point the Cakemuir Burn becomes the Fala Dam Burn. It then joins the East Water, a tributary of the Keith Water. SEPA has classified the Cakemuir Burn as A2 (good quality) under the Water Framework Directive, which is probably not at risk of failing to meet Good Ecological Status (GES). As the Keith Water is classified as A1, the Fala Dam Burn is assumed to be of the same quality. Water quality characteristics for this classification of watercourse have been obtained from the Leader Water; a watercourse of the same classification where data was available.

There are two minor unclassified burns located between the U77 Fala Dam junction and the B6458 Tynehead junction, which converge with Salters Burn approximately 400 metres downstream of the Salters Burn crossing of the A68. It is assumed that they are of the same quality as Salters Burn (A1).

There are no designated or protected watercourses within the vicinity of the scheme. Chapter 8 (Ecology and Nature Conservation) discusses the ecological status of the watercourses with respect to flora and fauna.

Based on the above information and in accordance with Table 13.1 above, the Cakemuir Burn is of **high importance** and all others are of **very high importance**.

13.3.3 Groundwater

The 1:625,000 scale Groundwater Vulnerability Map of Scotland shows the geological class (bedrock) are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. The superficial drift deposits overlying these are shown to be of low permeability in the southern half of the site. The majority of surface soils on the site are classified as ‘soils of high leaching potential’ and as such have little ability to attenuate diffuse contaminants and in which non-absorbed diffuse contaminants and liquid discharge will leach rapidly. Hence, much of the groundwater deposits are potentially vulnerable from any surface contamination, particularly in the northern section of the site.

The soils within the area of the scheme range from freely drained to imperfectly drained.

Chapter 14 (Geology and Soils) describes the ground material as comprising alluvial and boulder clay deposits overlying the geological class bedrock. This material is highly permeable due to the presence of significant fracturing. However, during the ground investigation, there was a greater presence of boulder clay than originally expected which means the surrounding ground will have lower permeability than originally anticipated.

In the A68 Pathhead to Tynehead Junction Improvement Scheme - Geotechnical Interpretative Report, September 2006, the mean water table ranges from ground level to a depth in excess of 8.5m below ground level.

There is a natural spring within the scheme boundary, located 230m north of the A68 / B6458 Tynehead junction. The spring originates on the southern side of the A68 adjacent to the northbound carriageway and then flows north through a culvert to the northern side of the A68. The spring then runs as a small watercourse between the A68 and Old Crichton Dean before it joins the Salters Burn some 50m north of the U77.

SEPA has indicated that in terms of groundwater quality there are no records for the area in the vicinity of the proposed scheme. It is known that the Lothian area has been affected by old mine workings and there is evidence of coal outcropping within the vicinity of the scheme.

SEPA have no records relating to groundwater abstraction in the vicinity of the scheme. SEPA are not aware of any boreholes within 2km radius of the site. Midlothian Council has a record of one private water supply borehole within 2km of this scheme. This is located at Hope Farm, 260m north of the proposed scheme. It should be noted that, although an abstraction-licensing regime is currently being developed in Scotland (The Water Environment (Controlled Activities) (Scotland) Regulations 2005), SEPA may not yet be aware of all abstractions in the vicinity of the site (operators of abstractions of <10 m^3 /day are not required to contact SEPA if they comply with the General Binding Rules). In the absence of information to the contrary, it is assumed that there are no Source Protection Zones (SPZ) in effect in this area.

Based on the above information and in accordance with Table 13.1 above, the groundwater attribute of this site is considered to be of **medium importance**.

13.3.4 Flooding

The Institute of Hydrology Flood Risk Maps show no designated floodplains associated with any of the water courses within the vicinity of the scheme.

As the route does not cross a flood plain or an area at risk of flooding (Figure 13.2), an Assessment of Flood Risk has not been undertaken.

However it should be noted that, following site inspections, it is evident that Salters Burn will overtop occasionally on to the adjacent agricultural fields. There are no residential or industrial properties at risk from flooding.

Based on the above information and in accordance with Table 13.1 above, the flooding attribute of this site is of **low importance**.

13.3.5 Accidental Spillage

On any traffic-carrying road there is potential for the pollution of watercourses and groundwater supplies from accidental spillages of harmful chemicals and materials caused by traffic accidents.

Calculations for the pollution impacts of this road scheme are based on the 2004 Average Annual Daily Traffic (AADT) flows, the percentage of Heavy Goods Vehicles (HGV) expected to be using the road and the layout of the carriageway and its junctions. The probability of a serious accidental spillage is calculated using the equation given in Annex I, HA216/06 Method D. The calculation sheet is given as Figure 13.13.

Table 13.4. Assessment of Pollution Impacts from Accidental Spillages.

	Risk	Return Period
Existing Road Configuration	2.16×10^{-4} /year ≡ 0.02%	≈ 4600 years

The DMRB indicates that an acceptable risk of a pollution incident would be 1 in 100 years for discharges to non-designated watercourses and areas.

The calculated return period, 1 in 4600 years, indicates that the existing risk of pollution through accidental spillage is very low; well below any level that would be considered significant.

As an accidental spillage incident would impact on the surface water and groundwater attributes of this site, the importance of each will be used when assessing the predicted impact significance.

13.4 Assessment of Impacts

This section discusses the potential impacts that the operation of the proposed new road alignment will have on road drainage and the water environment. Refer to Figures 13.4 to 13.9 for proposed layout.

13.4.1 Road Drainage

The scheme will result in an increase in road surface area through the widening of the existing A68 mainline. In addition the U60 will be realigned to maximise the overtaking opportunities on the A68 and the U77 will be realigned to maintain access to the residential property, Marldene. Although the U78 is to be stopped up at the junction with the A68, the remainder will be retained for access purposes. A new side road is to be constructed to connect the U77 and U78 to the A68. The B6458 will be realigned to improve access on to the A68.

Limited volumes of runoff from the new and realigned side roads will be incorporated in to the new A68 drainage system. The remainder will be dispersed to the surrounding agricultural land as is currently the case.

Potential impacts on the water resources within the study area may arise from increases in road runoff volumes due to the increase in surface area. The Salters Burn and the Cakemuir Burn have been identified as the most vulnerable hydrological features within the study area as they are in close proximity to the proposed scheme and will form part of the drainage network.

Following the methodology of Method A in HA216/06, a Simple Assessment of Pollution Impacts from Routine Runoff was carried out. Copies of the calculations are given in Figures 13.10 and 13.11 with the results summarised in Table 13.5 below.

Table 13.5. Simple Assessment of Pollution Impacts from Routine Runoff.

Watercourse	Watercourse 95^{th}%tile Flow (V_R)	Road Runoff Flow (V_H)	Dilution (V_R / V_H)
Salters Burn	570	140	4.1
Cakemuir/Fala Dam Burn	2678	76	35.2

From Figure A.2 in HA216/06, for a watercourse of Class A1 and a design year (2024) AADT of 12,800, a dilution of more than 5.6 times does not require any further assessment to be undertaken. A Detailed Assessment of Pollution Impacts from Routine Runoff is required for the Salters Burn as it only has a dilution rate of 4.1 times.

Following the methodology of Method B in HA216/06, a Detailed Assessment of Pollution Impacts from Routine Runoff was carried out for Salters Burn. A copy of the calculation sheet is given in Figures 13.10 and 13.11 and the results are summarised in Table 13.6 below.

Table 13.6. Water Quality Prediction.

	Watercourse	Pollutant	
		Dissolved Copper	Total Zinc
Existing Configuration	Salters Burn	9.0 µg/l	32.2 µg/l
Proposed Configuration	Salters Burn	13.7 µg/l	47.6 µg/l
Environmental Quality Standard (EQS)		**3.0 µg/l**	**15.0 µg/l**

It can be seen from these results that the calculated levels of dissolved copper and total zinc for the existing and proposed configurations in the Salters Burn are greater than the EQS levels supplied by SEPA. Based on this alone, mitigation is recommended.

The impact of the increased road runoff is assessed to be of **major adverse magnitude**.

To summarise, the Cakemuir Burn is considered to be of high importance and with an impact of major adverse magnitude, the impact will potentially be of **very large adverse significance**. Salters Burn and the other surface waters are of very high importance and the impact of the increased road runoff will be of major adverse magnitude as the existing configuration exceeds the EQS levels. Using Table 13.3, this impact is of **very large adverse significance**.

Mitigation measures are to be implemented for this scheme and are detailed in Section 13.5.1 below.

13.4.2 Surface Water

The proposed scheme requires the Salters Burn culvert to be extended adjacent to the southbound carriageway to accommodate the carriageway widening (Figure 13.5).

The proposed scheme will also require the extension of the small culvert carrying the unnamed spring, shown on Figure 13.5, beneath the A68, 230m north-west of Tynehead junction. This is required to incorporate the widening of the A68 adjacent to the southbound carriageway.

The existing 600mm diameter concrete pipe culvert immediately adjacent to the A68 / B6458 junction needs to be re-profiled and lowered in order to accommodate the vertical adjustments to the mainline carriageway. Details are shown on Figure 13.3.

As shown on Figure 13.6, two new culverts are required to allow construction of the new side road that will connect the A68 to the U77 and U78. These new culverts will both be approximately 50m long.

SEPA have been consulted on all of the culvert alterations and are satisfied with the proposals providing that they are designed to incorporate a natural watercourse bed, ledges for mammals to utilise, designed with reference to Scottish Executive's River Crossing & Migratory Fish: Design Guidance, and generally appear as natural as possible. All culvert alterations and installations have been designed in accordance with the requirements of the SEPA implementation of the Water Framework Directive and the Controlled Activity Regulations for the protection, improvement and sustainable use of watercourses in the area and will be timed to avoid fish migration. Reference shall also be made to CIRIA Report 168, Culvert Design Guide.

Once fully constructed, the extended culverts will have no significant impact on either the water quality of the watercourses or the drainage of the area.

To summarise, the watercourses are of high (Cakemuir Burn) and very high importance (all others) and the impact magnitude of the alterations to the watercourses and culverts is considered to be **negligible**. Using Table 13.3, the overall impact is **neutral**.

Mitigation measures are not required as any potential adverse impacts have been removed through good design practice.

13.4.3 Groundwater

Following the methodology of Method C in HA216/06, an Assessment of Pollution Impacts from Routine Runoff on Groundwater was carried out. The result of this assessment identified that the groundwater attribute of this site is at Medium Risk (Table C1, HA216/06) of pollution from routine runoff. As this area is an aquifer then the impact is of Moderate Significance (Table C3, HA216/06). A copy of the assessment calculation is given as Figure 13.12.

The proposed wrapped filter drains and detention ponds will partially treat the runoff prior to it entering the groundwater system (Figures 13.4 to 13.9).

Following ongoing consultation, SEPA are satisfied that the proposed drainage arrangements will not adversely affect the groundwater regime in the area. For these reasons, the overall impact is considered to be of **slight adverse significance** (groundwater importance was previously identified as medium (section 13.3.3.), with a magnitude of moderate adverse in line with DMRB (Table 13.2) but subsequently considered to be minor by the regulatory authority).

13.4.4 Flooding

As the scheme is a road widening and does not cross a flood plain, the methodology in HA216/06 does not require a Flood Risk Assessment to be carried out.

13.4.5 Accidental Spillage

The probability of a serious accidental spillage in the design year (2024) was calculated using the 2004 AADT of 12,800 and %HGV flows. The results are presented within Figure 13.1 and Table 13.7 below (alongside the existing risk for comparison).

Table 13.7. Risk of Accidental Spillage.

Option	Risk	Return Period
Existing Road Configuration	2.16×10^{-4} /year ≡ 0.02%	≈ 4600 years
Proposed Scheme	3.04×10^{-4} /year ≡ 0.03%	≈ 3600 years

The calculated return period for the proposed scheme, 1 in 3600 years, indicates that the risk of pollution through accidental spillage, although higher than the existing situation, is still very low relative to the assessment standards of 1 in 100 years.

From Table 13.2 and given the very low probability of an incident, the impact of the proposed scheme on accidental spillage risk will be of **negligible magnitude**. The local watercourses have previously been assessed as being of **very high and high**

importance. Therefore, based on Table 13.3, the changes to the accidental spillage risk are of **neutral significance**.

13.5 Mitigation

The only significant issue identified above that requires the implementation of mitigation is related to road drainage and the potential adverse impact upon the surrounding surface waters. Mitigation is described below along for road drainage, with an explanation of the best practice measures that will also be applied to ensure any impacts are controlled and minimised as far as possible.

13.5.1 General

SEPA, along with the Environment Agency (in England and Wales) and the Environment and Heritage Service (in Northern Ireland), have produced of a range of Pollution Prevention Guidelines (PPGs). Each PPG is targeted at a particular industrial sector or activity and aims to provide advice on statutory responsibilities and good environmental practice. The following PGGs will be used for the development of the proposed scheme:

- PPG1 General guide to the prevention of pollution;
- PPG5 Works in, near or liable to affect watercourses;
- PG6 Working at construction and demolition sites;
- PPG21 Pollution incident response planning; and
- PPG22 Dealing with spillages on highways.

The above PPG documents and the 'Special Requirements in Relation to the Scottish Environment Protection Agency' regarding Controlled Waters will be strictly adhered to during both construction and operational phases. This will be implemented during the construction process through contract documentation.

13.5.2 Road Drainage

Following ongoing consultation, SEPA have confirmed that they are satisfied that the use of a combination of wrapped filter drains, swales and detention ponds (as specified in Tables 3.7, 3.8 and 9.7.2 of 'Sustainable Drainage Systems – Hydraulic, Structural and Water Quality Advice' (CIRIA, 2004)), will reduce the concentrations of contaminants by up to 80%. The results indicate that the proposed online improvements could have minimal impact, with mitigation, or even improve the existing situation when compared to the existing conditions.

Potential road drainage and water environment impacts that have been either generated or exacerbated by the proposed scheme, can be mitigated through the development of Sustainable Drainage Systems (SUDS). The principle of SUDS is to maintain, as far as possible, the original drainage pattern of the site, catchment topography, ground conditions and the location of discharge points. Also, utilising SUDS within a drainage network may protect and enhance the water quality of existing watercourses. The SUDS principles that will be included in this scheme take the form of over the edge filter drains, swales and detention ponds, as shown on Figures 13.4 to 13.9. The impact of these mitigation proposals will have a **minor beneficial** impact on the road drainage attribute.

Given the high/very high importance of the watercourses, this will result in a **moderate beneficial** significance.

13.5.3 Accidental Spillage

Although not required as mitigation from the assessment process, the use of the drainage systems described above will also afford an additional level of containment should an accidental spillage occur. This will provide additional time for emergency procedures to be put into effect and will further reduce the impact of pollution following an accidental spillage. This will be of **minor beneficial** significance.

13.5.4 Maintenance of SUDS

The SUDS that are put in place will be become the maintenance responsibility of the Trunk Road Maintaining Agent Contractor. They will maintain these systems in accordance with guidance in the CIRIA Report 609.

13.6 Residual Impacts

Given the proposed design and proposed mitigation measures, there will be no residual adverse impacts as a result of this scheme. By utilising a combination of wrapped filter drains, swales and detention basins, runoff can be treated and controlled which will ultimately improve the road drainage and water environment.

Table 13.8. Summary of Impacts.

Attribute	Impact Without Mitigation	Impact With Mitigation
Road Drainage	Very Large Adverse	Moderate Beneficial
Surface Water	Neutral Significance	Neutral Significance
Groundwater	Slight Significance	Slight Significance
Flood Risk	None	N/A
Accidental Spillage	Neutral Significance	Minor Beneficial