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~~April 2009~~ November 2011

MERSEY GATEWAY PROJECT

AQUATIC ECOLOGY MONITORING PLAN

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C O N T E N T S

1. INTRODUCTION

1.1 General

1.1.1 As part of the proposals to construct a second road crossing of the River Mersey between Widnes and Runcorn ("the Project"), a series of applications have been made for orders authorising works within the River Mersey and upon land adjacent to the River. ~~These applications have been accompanied by an Environmental Statement (ES).~~

1.1.2 A **C**onstruction and **O**peration code of **P**ractice for **E**nvironmental management (COPE) has been developed ~~for the Project~~ to define the measures required to mitigate and monitor the construction and operation of the Project including the proposals contained in the Further Applications (hereafter referred to as the "Project including the Proposals") to protect the environment. The COPE covers specific regulatory, legislative and best practice requirements. It also provides for measures set out in the ~~Project's~~ Further Applications ES.

1.1.3 The Project including the Proposals and their potential impacts on Aquatic Ecology have been considered in the Aquatic Ecology Chapter of the Further Applications ES.

1.1.4 In considering the applications and the Further Applications ES, the Environment Agency (EA) and Natural England (NE) have commented on the proposals. This has resulted in the agreement to secure the monitoring of the characteristics of the Study Area in relation to aquatic ecology monitoring.

1.1.5 Appendix A of the COPE comprises a series of monitoring plans for the Project including the Proposals, of which this document is one, which have been developed as a result of consultation on application and consideration of the Further Applications ES as described above.

1.1.6 This document comprises a draft proposal for the monitoring of aquatic ecology during both construction and for an appropriate period following completion of the construction of the Project including Proposals. Its contents will be subject to agreements between Halton Borough Council (~~HBC~~ "the Council"), the EA and NE.

1.1.7 The details set out within these monitoring plans will be secured through relevant planning conditions and/or the implementation of the Construction Environment Management Plan (CEMP) for the Project including the Proposals.

1.2 Proposed Approach

1.2.1 This Aquatic Ecology Monitoring Framework comprises a Monitoring Framework, an Exceptions Plan (Appendix A) and a Monitoring Programme (Appendix B). The Monitoring Framework sets out the aquatic ecology monitoring required before, during and after construction within areas of the Mersey Estuary and certain freshwater watercourses potentially affected by the Project including the Proposals, and also where required within the River Mersey upstream of the Project including the Proposals.

1.2.2 The aim of the Framework is to:

a. Establish a robust aquatic ecology baseline data set building upon the results of the Further Applications ES;
b. Ensure key components of aquatic ecology are protected as far as possible during construction and operation (with emphasis on species of conservation interest);

c. Prevent knock-on effects to downstream designated sites and species which depend on these habitats;
d. Monitor the success of the mitigation measures adopted and set out in Appendix C; and
e. Inform long term management plans to conserve the aquatic ecology of the main Estuary and freshwater watercourses potentially impacted by the Project including the Proposals.

2. PROPOSED AQUATIC ECOLOGY MONITORING

2.1 Framework and Stakeholder Involvement

2.1.1 Ecological monitoring will be undertaken prior to, during and after construction of the Project including the Proposals. It is considered that monitoring should be conducted for 2 years prior to construction and it is estimated that construction works within the River Mersey itself will commence in ~~2011~~ 2013 (construction start date) and be ongoing for 3 years. Once in operation, there will be a period of post-construction monitoring which is expected to last a further 5 years. The total timeframe of the aquatic ecology monitoring framework will therefore be 10 years from ~~2009 onwards~~ the commencement of the pre-construction monitoring.

2.1.2 This document will form part of the mitigation and monitoring requirements for the Project including the Proposals. Documents produced as part of the monitoring requirement will be supplied to the EA an NE [To be listed]. The information may be supplied on behalf of ~~HBC~~ the Council by the ~~Concessionaire~~ Project Company appointed to build and operate the new bridge.

Comment [s1]: StC to confirm with APEM

2.2 Draft Monitoring Plan

2.2.1 The Aquatic Ecology Monitoring Framework covers a period of 10 years, including both the pre construction surveys (estimated at 2 years), in-river construction works (estimated at 3 years) and post-construction phases (up to 5 years).

2.2.2 The Monitoring Framework covers a series of aquatic ecology features, monitoring requirements, timescales and frequencies. It comprises a framework of monitoring techniques to be undertaken over the specified monitoring periods. The Monitoring Framework also includes details of the trigger levels that will be used to initiate the Exceptions Plan (Appendix A).

2.2.3 The Exceptions Plan consists of a procedure, trigger levels and mitigation measures to mitigate effects. Exceedance of the triggers identified would result in the initiation of the Exceptions Plan. The exceedance of these triggers would be identified using the results of survey undertaken pre, during and after construction.

2.2.4 A summary of the Monitoring Programme has been provided at Appendix B, this illustrates the timings and frequencies of the ecological monitoring that is proposed as part of the Monitoring Framework for incorporation into the overall construction programme.

2.3 Components of the Monitoring Plan

2.3.1 Ecological receptors (or components) within the main Estuary that will be monitored are:

a. Benthic algae;
b. Phytoplankton;
c. Benthic Invertebrates;
d. Epifauna;
e. Fish; and
f. Marine mammals.

2.3.2 Ecological receptors (or components) within the freshwater watercourse that will be monitored are:

a. Macrophytes; and
b. Invertebrates.

Location

A series of monitoring techniques will be used at locations within the Study Area (see Appendix D). The proposed monitoring locations are a selection of sites which have been previously monitored during the Aquatic Ecology baseline survey for the Environmental Impact Assessment relating to the Project and subsequently the Project including the Proposals. Locations will be subject to approval by the local planning authority in consultation with the Environment Agency and Natural England.

Survey Information

Pre Construction Monitoring

2.3.3 Sampling of estuarine benthic algae, invertebrates and fish, and freshwater macrophytes and invertebrates would be carried out utilising the same sampling methods described within the Aquatic Ecology Chapter of the Mersey Gateway Environmental Statement (Section 11.5: Assessment Methodology) and summarised in Paragraph 2.3.8 below.

2.3.4 Phytoplankton monitoring would also be conducted during the pre-construction phase. This is because this group of organisms is used to assess the ecological quality of estuaries under the Water Framework Directive. Sample sites will be subject to approval by the local planning authority in consultation with the Environment Agency and Natural England.

2.3.5 Monitoring would continue during pre-construction within the main Estuary and the freshwater watercourses of Stewards and Bowers Brook, Bowers Brook spur and the St. Helen's and Bridgewater Canals.

2.3.6 Pre construction baseline monitoring within the main Estuary will comprise the following surveys:

a. Benthic algae: Sampled via intertidal cores. Five sites will be sampled in both Zones 1 and 2 during spring and summer.
b. Phytoplankton: Sampled by collecting water samples within the Estuary. Five sites will be sampled in both Zones 1 and 2 during spring and summer.
c. Benthic Invertebrates: Subtidal invertebrates will be sampled via an Eckman grab, while intertidal invertebrates will be sampled using intertidal cores. Five subtidal and five intertidal sites will be sampled in both Zones 1 and 2 during spring and summer

d. Epifauna: Sampled within the main Estuary and saltmarsh scrapes via epifaunal trawls using a dredge. Five sites will be sampled in both Zones 1 and 2, and two scrapes in Zone 2 will be monitored during spring and summer.
e. Fish: Sampled within the main Estuary via beam trawling, some fish will also be caught as by-catch by the epifaunal dredge. These sampling methods will be deployed at five sites in both Zones 1 and 2. Fish within saltmarsh scrapes will be sampled via seine netting at 2 sites. All sampling will be undertaken in spring and summer.
f. Marine mammals: During the pre-construction phase any marine mammal survey sightings, by the public and the Mersey Estuary Conservation Group would be collated where possible.

2.3.7 Pre construction baseline monitoring within the freshwater watercourses will comprise the following surveys:

a. Macrophytes: Sampled via grapnel and visual survey. Three sites will be sampled in each of Stewards Brook, Bowers Brook, Bowers Brook spur, the St. Helens Canal and the Bridgewater Canal. Sampling will be conducted during spring and summer.

b. Invertebrates: Sampled via kick sample/dredge. Three sites will be sampled in each of Stewards Brook, Bowers Brook, Bowers Brook spur, the St. Helens Canal and the Bridgewater Canal. Sampling will be conducted during spring and summer.

2.3.8 Pre construction baseline monitoring upstream of the main Estuary will comprise the following surveys:

a. Fish: Salmon, lamprey and eel will be monitored by counting numbers of these species caught at the fish trap on Woolston Weir upstream of the Survey Area. The trap will be monitored over at least one day a week throughout the year, but with a three month intensive sampling period (involving monitoring 5 days each week) being conducted during the peak migration in later summer/autumn. The intensive sampling data would be used to predict weekly catches for the remainder of the year (i.e. when sampling was conducted one day a week) using a linear interpolation approach.

Monitoring During Construction

2.3.9 The routine monitoring detailed in 2.3.3 - 2.3.8 above will also be conducted during the construction phase.

2.3.10 In addition, due to the potential impacts of elevated underwater noise levels on fish and marine mammals noise would be measured during pile driving using hydrophones. A zone of radius 200 m would be monitored by 'spotters' looking for marine mammals during construction, mammal spotters would be monitoring the safety zone every day during pile driving activity. Following commencement of piling and accompanying noise measurement, the safe zone for fish would be defined by a circle with a radius within which underwater noise does not exceed 180 dB re: 1 µPa. Values above these levels are considered to be harmful by the United States National Marine Fisheries Service.

2.3.11 In terms of marine mammals, the underwater noise limit above which noise levels are considered potentially harmful is 190 dB re: 1 µPa for pinnipeds (e.g. seals) and 180 dB re:1 µPa for odontocetes (e.g. toothed whales, dolphins and porpoises). Therefore, the precautionary principle will be applied and the safe zone for all marine mammals will be defined by a circle with a radius within which underwater noise does not exceed 180 dB re: 1 µPa (this is the same underwater noise limit as for fish).

2.3.12 Elevated noise levels above this value would result in the actions detailed in Appendix A.

2.3.13 Similarly, suspended sediment levels would be monitored during construction. Monitoring of suspended solids is outlined in the Surface Water Quality Monitoring Plan.

2.3.14 Water column contaminant levels would also be monitored as outlined in the Surface Water Quality Monitoring Plan.

Post Construction Monitoring

2.3.15 The routine monitoring detailed in 2.3.3 - 2.3.8 above will also be conducted for 5 years post construction to provide further data to assess if the presence of the bridge is having an effect on aquatic ecology. Due to the reduction in the western extent of the works under the Updated Reference Design for the Project including the Proposals the main change is that Stewards Brook will no longer be impacted by the Project including the Proposals during the operational phase as it is located outside the development area and no drainage will be directed to it. For this reason it is considered that there is no longer a requirement to monitor Stewards Brook post construction (as the Red Line boundary for the Project including the Proposals is in the vicinity of Stewards Brook there is the potential for surface run-off or spillages from any construction compounds built in the area which is why monitoring during the construction phase is still required).

2.3.16 Levels of suspended solids within the Study Areas will also be monitored for 5 years post construction as outlined in the Surface Water Quality Monitoring Plan.

2.3.17 Monitoring data regarding changes in water quality within the Estuary will be considered when assessing the aquatic ecology monitoring results.

Trigger Levels

2.3.18 Trigger levels for key components of aquatic ecology within the main Estuary and/or freshwater watercourses (i.e. benthic algae, macrophytes, phytoplankton, invertebrates and fish) would be a change in abundance and/or community composition above and beyond the baseline ranges identified during the ~~7 year pre-construction monitoring period (inclusive of the baseline ES surveys~~ 2002/04 (depending on receptor) to 2011 period considered for the Further Applications ES Aquatic Ecology chapter which encompasses the 2008 data collected to inform the Public Inquiry and the 2011 data collected to inform the Further Applications ES and the further 2 years before commencement of construction), or the 2 survey years pre-construction period in the case of phytoplankton. Any anomalous environmental conditions (e.g. storm events), however, would also be considered when assessing these data.

2.3.19 Trigger levels for salmon specifically, would be a decrease in numbers caught in the trap at Woolston Weir during and post construction to levels below the numbers recorded during the 2 year pre-construction monitoring period.

2.3.20 If noise levels are elevated above the limits detailed in 2.3.10 and 2.3.11 then pile driving would cease for a short period to allow any migratory fish to pass the area, or until any marine mammals present were observed to have left the area. In addition, the method of piling could be modified, where possible.

2.3.21 A second trigger level for marine mammals would be the spotting of a marine mammal within the safety zone during pile driving.

2.3.22 Trigger levels for suspended sediments and concentrations of contaminants are detailed in the Surface Water Quality Monitoring Plan.

2.4 Exceptions Plan

2.4.1 At this stage, the Aquatic Ecology Exceptions Plan comprises a flow chart showing the procedures to be implemented should the trigger levels listed in this report be exceeded. This is shown in Appendix A.

2.4.2 The Aquatic Ecology Exceptions Plan consists of steps to facilitate remediation if any triggers discussed in the Monitoring Framework are exceeded within the Aquatic Ecology Monitoring Framework during either the construction or post-construction phase.

2.4.3 The Aquatic Ecology Exceptions Plan consists of three potential actions:

Level	Action Type
1	Continuous review and monitoring of change
2	Change and/or increase to the frequency of monitoring
3	Intervention

2.4.4 The last category, intervention, could comprise a number of actions as set out in the Monitoring Framework. The exact nature of the intervention (s) will depend on the exact nature of the effect monitored, but will aim to minimise adverse effects on ecological components and promote the success of the mitigation implemented.

2.5 Reporting

Pre-Construction Reporting

2.5.1 Baseline ecological data collated in the period leading up to the construction of the Project including the Proposals will be collated with existing baseline information in a pre-construction ecology survey report. This information will then help inform the proposed mitigation and provide a baseline against which the effects of construction and success of the mitigation implemented can be measured.

Construction Period Reporting

2.5.2 Routinely, the results of the ecological surveillance will be reported to the parties to the monitoring agreement. Factual reports will be prepared on a quarterly basis during construction in line with the CEMP requirements.

Post Construction Reporting

2.5.3 For 5 years following construction an annual estuarine ecology monitoring report will be prepared throughout the monitoring period. It is proposed that a stakeholder meeting will be held annually to consider the monitoring report and discuss the results.

Exceptions Reporting

2.5.4 Where any exception occurs, this will be reported as soon as reasonably practicable. At this point, the actions proposed will also be notified to parties affected.

APPENDIX A: EXCEPTIONS PLAN

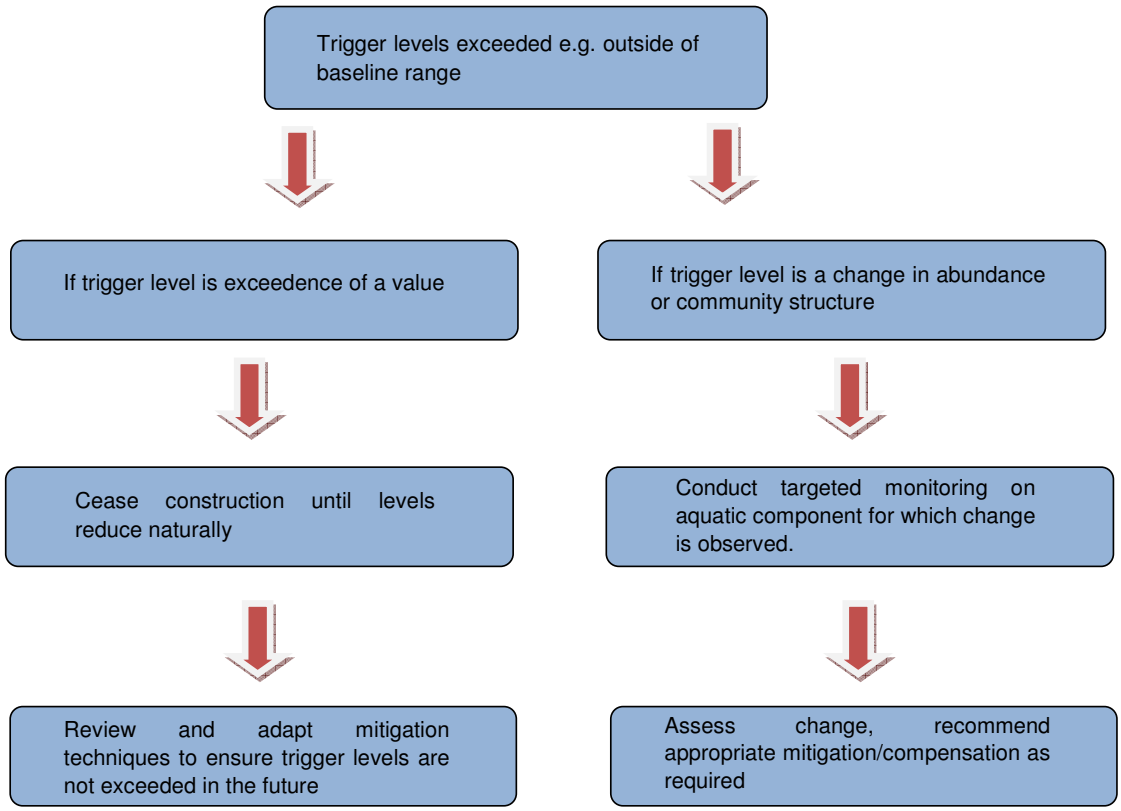
Trigger Levels

A1. The trigger levels will be based on the baseline levels of the determinands measured during pre-construction monitoring. Once baseline monitoring has been completed, exact values for the trigger levels will be determined.

Watercourse	Determinand	Trigger level
1. Mersey Estuary	Benthic algae, phytoplankton, benthic invertebrates, fish.	A change in abundance or community composition (above and beyond that observed for the pre-construction baseline data). Environmental conditions unrelated to the Project including the Proposals would be considerd when assessing the trigger level following establishment of the baseline.
2. River Mersey	Salmon.	A decline in numbers caught in the fish trap at Woolston Weir following establishment of the baseline during construction of the Project including the Proposals.
3. Freshwater watercourses	Macrophytes, invertebrates.	A change in abundance or community composition (above and beyond that observed for the pre-construction baseline data). Environmental conditions unrelated to the Project including the Proposals would be considerd when assessing the trigger level following establishment of the baseline.
4. Mersey Estuary	Safety zone for marine mammals	Observation of a marine mammal within the safety zone during construction.
5. Mersey Estuary	Underwater Noise	180 dB re: 1 µPa for fish. 180 dB re: 1 µPa for marine mammals.

Exceptions Plan

A2. If trigger levels are exceeded, the following exceptions plan should be implemented.



APPENDIX B: MONITORING PROGRAMME

The information below provides an outline of the sampling frequency required by the proposed Aquatic Ecology Monitoring Framework.

Monitoring Period	Receptor	Parameters measured	Frequency
Pre construction monitoring	**Infauna and benthic algae**	Abundance and community composition	Spring and summer each year
	Phytoplankton	Abundance and community composition	Spring and summer each year
	Epifauna and fish	Abundance and community composition	Spring and summer each year
	Marine mammals	Abundance and community composition (assessment of available information and consultation with appropriate organisations)	Ongoing
	Canal and brook flora and fauna	Abundance and community composition (macrophytes and invertebrates)	Spring and summer each year
	Migratory fish	Abundance	One day a week throughout the year, with three months monitoring for 5 days each week during the peak migration period (late summer and autumn)
Construction monitoring	**Infauna and benthic algae**	Abundance and community composition	Spring and summer each year
	Phytoplankton	Abundance and community composition	Spring and summer each year
	Epifauna and fish	Abundance and community composition. Measurement of underwater noise using hydrophones.	Spring and summer each year Noise measurement during pile driving activity
	Marine mammals	Spotters to observe mammals within safety zone during construction. Measurement of underwater noise using hydrophones.	During pile driving activity
	Canal and brook flora and fauna	Abundance and community composition (macrophytes and invertebrates)	Spring and summer each year
	Migratory fish	Abundance	One day a week throughout the year, with three months monitoring for 5 days each week during the peak

Monitoring Period	Receptor	Parameters measured	Frequency
			migration period (late summer and autumn).
Post construction monitoring	**Infauna and benthic algae**	Abundance and community composition	Spring and summer each year
	Phytoplankton	Abundance and community composition	Spring and summer each year
	Epifauna and fish	Abundance and community composition.	Spring and summer each year
	Canal and brook flora and fauna (not including Stewards Brook)	Abundance and community composition.	Spring and summer each year
	Migratory fish	Abundance	One day a week throughout the year, with three months monitoring for 5 days each week during the peak migration period (late summer and autumn).

APPENDIX C: MITIGATION MEASURES

Effect	Mitigation & Enhancement Measure	Source
Construction Phase		
Potential disturbance, auditory problems, loss of balance and coordination, from pile driving noise. In extreme cases possible mortality near pile driving source. Noise from hover barges to epifauna and fish.	Use of suitable pile driving method e.g. vibro piling where possible. Maintenance of 'noise free' window (at least during hours of darkness) for times of peak migration. Noise to be monitored during construction via hydrophones with reaction to elevated noise levels.	Chapter 11, ES
Potential disturbance, auditory problems, loss of balance and coordination, from pile driving noise. In extreme cases possible mortality near pile driving source. Noise from hover barges to marine mammals.	Establishment of a safety zone to protect marine mammals.	Chapter 11, ES
Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to intertidal and subtidal habitat	Removal of sediment to a suitable disposal site. Work conducted during low tide where possible. Monitoring of turbidity in the vicinity of the New Bridge with reaction to elevated levels (see Surface Water Quality Monitoring Framework).	Chapter 11, ES
Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to infauna and benthic algae.		
Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to epifauna and fish.		

Effect	Mitigation & Enhancement Measure	Source
Erosion of sediments/spillages and leakages of material. Potential release of contaminants within intertidal zone, .e.g. planings containing tar to intertidal and subtidal habitat.	Removal of excavated material and dewater to appropriate disposal sites. Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Store hazardous material in secure containers to avoid spillage and leakage.	Chapter 11, ES
Potentially direct damage to organisms if above Predicted No Effect Concentrations (PNECs) for specific taxa. Bioaccumulation of contaminants along food chain to infauna and benthic algae.		
Potentially direct adverse effect on epifauna and fish species (depending on type of pollutant and its concentration in sediments/water column). Damage due to consumption of contaminated prey items and bioaccumulation of contaminants to epifauna and fish.		
Pollutant release, mainly due to spills and leakages of materials. Potentially adverse effect on aquatic fauna and flora depending upon type of pollutant and its concentration. Bioaccumulation of contaminants.		
Construction of tower, piers, cofferdams and stone haul road. Direct loss of sediment habitat, tower surfaces would create a small area of new habitat to intertidal and subtidal habitat.	No mitigation possible.	Chapter 11, ES
Construction of tower, piers cofferdams and stone haul road. Direct loss of sediment habitat, tower surfaces would create a small area of new habitat to infauna and benthic algae.	No mitigation possible.	Chapter 11, ES
Fish can move away from impacted areas and relocate to areas away from the site of construction. If stone haul road construction removes saltmarsh scrapes (potentially important habitat) this would decrease availability of potentially important intertidal refuge areas for fish. Cofferdam and pier structures may disorientate and impede salmon migration.	Ensure adequate space between pilings for fish to pass through.	Chapter 11, ES
Infilling of section of the St Helens Canal and potential reduction in canal width under construction Option 1. Fish likely to be impacted. Displacement of organisms and reduction of available habitats for aquatic flora and fauna.	No mitigation possible.	Chapter 11, ES
Operational Phase		

Effect	Mitigation & Enhancement Measure	Source
Dispersal of contaminants due to resuspension of deeper sediments. Pollution of intertidal sediments due to road runoff/spillages to intertidal and subtidal habitat.	Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Interceptors on bridge and to prevent road spillages/runoff.	Chapter 11, ES
Potential for more contaminants to be released into water column. Concentrations not expected to exceed levels to which organisms in near-surface sediments are currently exposed. Spillages/runoff could lea to local increase in contaminants. Bioaccumulation of contaminants along food chain to infauna and benthic algae.		
Contaminant levels released due to erosion are not predicted to exceed current elevated levels. Spillages/runoff could lead to local increase in contaminants. Fish and epifauna can move away from areas of disturbance. Bioaccumulation of contaminants along food chain.		
Primarily due to road runoff and spillage. Low rate of dispersal due to slow flow in canals. Contaminants could have adverse impact on infauna. Fish would be expected to move away from impacted area. Bioaccumulation of contaminants along food chain.	Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Interceptors on bridge and to prevent road spillages/runoff. Treatment of runoff before entering St Helens Canal and Stewards Brook.	Chapter 11, ES
Potential adverse impact due to increase organic input from roosting birds. Depletion of dissolved oxygen levels in water column due to increase bacterial activity. Potential local reduction in macroinvertebrate diversity.	No mitigation possible.	Chapter 11, ES

APPENDIX D: MAP OF STUDY AREA