MERSEY GATEWAY PROJECT

CONSTRUCTION AND OPERATION CODE OF PRACTICE
FOR ENVIRONMENTAL MANAGEMENT

Halton Borough Council
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APPENDIX A3 Upper Mersey Estuary Ecological Monitoring Plan
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1. INTRODUCTION

1.1 The Mersey Gateway Project

1.1.1 Halton Borough Council (the “Council”) is promoting a new road crossing of the Mersey Estuary (the “Estuary”) in the Borough of Halton (the “Borough”) and associated works to incorporate the new road crossing into the existing road network and to make changes to that network. Collectively the works required are known as the Mersey Gateway Project (hereafter referred to as the “Project”).

1.1.2 The Project will provide effective road connections to the Liverpool City area from north Cheshire in the south, thereby providing effective connectivity for the sub-region and addressing existing congestion in the Borough. The new road capacity provides an opportunity to re-balance the transportation infrastructure within Halton towards delivering local sustainable transport and economic goals.

1.1.3 The Project’s scope includes the following:

a. The delivery of a new road crossing of the River in Halton, known as the Mersey Gateway Bridge (referred to as the “New Bridge” throughout this report);

b. Incorporation of the New Bridge in the existing highway network. These works are referred to as the Remote Highway Works;

c. Modification and de-linking of the Silver Jubilee Bridge (SJB);

d. Integration of the revised networks with public transport, cycle and pedestrian links across Halton;

e. Integration with the surrounding environment through landscaping and on the New Bridge and SJB; and

f. Implementation of tolling and development of associated infrastructures.

1.2 The Purpose and Aims of the Code of Practice

1.2.1 The purpose of this Construction and Operation code of Practice for Environmental management (COPE) is to define the measures required to mitigate and monitor the construction and operation of the Project so as to protect the environment. It elaborates upon the mitigation proposals set out in the Environmental Statement (ES) and also those that the Council, as the promoters of the Project, proposes following discussions with the Local Planning Authority (LPA) and stakeholders. It covers specific regulatory and best practice requirements.

1.2.2 This COPE sets out provisions for the management, mitigation and monitoring of environmental effects during the construction and operational phases of the Project’s implementation. It also outlines provisions for auditing, reporting and action to be taken to rectify any breaches to the COPE during construction and operation.

1.2.3 The provisions of the COPE will be secured through the implementation of planning conditions and incorporated into the contract(s) for the construction and operation of the Project. Because the Council will not build and operate the Project, any Concessionaire that it appoints to design build and operate the Project, is likely to be responsible for discharge of these responsibilities.
1.2.4 Some of the environmental topics addressed within this COPE are developed to a greater level of detail than others. This is because the mitigation in some areas will require final, detailed approval once the construction methodologies to be adopted by the Concessionaire are known. However, in all cases the mitigation is specified at a sufficient level of detail to allow environmental effects of the Project properly to have been addressed.

1.3 Plans

1.3.1 This COPE sets out a code of practice for the construction and operation of the Project to ensure protection of the environment. As part of the Project’s construction and operation a number of specific operational techniques and activities are required to take place. This COPE sets out the requirements for a series of more detailed environmental management plans that will need to be prepared so that the objectives of this COPE are satisfied, environmental requirements are met and the environment is protected.

1.3.2 These more detailed environmental management plans will include those set out below at Table 1. This COPE makes reference to these specific plans where necessary in Sections 4 to 14. These plans may also be used in the discharge of the planning conditions.

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1.4 Structure of this Document

1.4.1 This document is set out in sections relating to the environmental topics addressed by the Environmental Impact Assessment and documented in the ES which accompanied the orders and applications for the Project submitted in 2008.

1.4.2 The remainder of the COPE is structured as follows:

1.4.3 Section 2: describes the regulatory framework that has informed the production of this COPE.

1.4.4 Section 3: outlines the implementation schedule for the COPE including roles and responsibilities, communication and reporting pathways, environmental training and awareness and monitoring mechanisms.

1.4.5 Sections 4 to 14: set out the standards of construction and operational practice for the individual topics addressed in the ES as shown below.

| Chapter 4 | Construction Arrangements |
| Chapter 5 | Hydrodynamics |
| Chapter 6 | Surface Water Quality |
| Chapter 7 | Avian Ecology |
| Chapter 8 | Terrestrial Ecology |
2. REGULATORY ENVIRONMENTAL REQUIREMENTS

2.1 Register of Environmental Legislation

2.1.1 All works will be undertaken in accordance with relevant Codes, Standards, Regulations and Acts of Parliament that cover environmental and related matters. These are summarised in the relevant chapters of this COPE (albeit that this summary is not exhaustive).

2.1.2 Notwithstanding these references, compliance with this COPE will not absolve any person from compliance with all legislative requirements applicable at the time of Project construction and operation. Wherever this COPE makes reference to Legislation, Standards or Codes it will be the necessary to ensure that the current versions are used at all times.
3. IMPLEMENTATION SCHEDULE

3.1 Roles and Responsibilities

3.1.1 The need for accountability and responsibility for environmental issues should be recognised by everyone involved in the construction and operation of the Project. This will include site staff and operatives, who are a key determinant of environmental performance, and senior management staff who will ensure that the works are undertaken in accordance with this COPE.

3.1.2 It will be necessary to establish and maintain contact with the LPA and local residents and keep them informed of construction matters likely to affect them. It will be necessary to demonstrate compliance with this COPE through the management, monitoring, auditing and training procedures in place.

3.1.3 The Council expects that the roles below will be performed by its Concessionaire.

3.2 Communication

Stakeholder Communication

3.2.1 A Project Liaison Officer will be provided to manage public relations, information and press related matters, who will liaise with the LPA, other statutory bodies, members of the public, press and the media on matters relating to the construction and operation of the Project.

Internal Communication

3.2.2 An Environmental Co-ordinator must be provided by the Concessionaire to liaise with all statutory environmental organisations during the construction and operation of the Project as per the requirements set out in this COPE. The Environmental Co-ordinator will manage the implementation of environmental procedures as set out in this COPE to all staff and site personnel to ensure compliance with the COPE. The Environmental Co-ordinator will be responsible for ensuring that all staff are adequately briefed of their environmental duties under this COPE and organising environmental training.

External Communication

Website

3.2.3 A website will be provided and maintained for the duration of the Project’s construction and for 5 years following the year of its opening, which will provide up-to-date information on such issues as the progress of the works, current areas affected by construction, temporary road closures and scheduled maintenance works. The website will also provide details of the results of monitoring carried out as part of the management plans set out in this COPE (see Table 1).
Complaints Procedure and Protocol

3.2.4 A ‘Complaints Hotline’ will be provided and maintained to deal with any complaints received in connection with the construction of the Project. The hotline should be answered by designated competent operator between the hours of 0700 and one hour after construction is terminated for the day. Outside these hours an automated call recording service will be provided. The telephone and fax numbers and the website address of the hotline will be provided through the press and be clearly displayed on hoarding or notices around and in the vicinity of every work site.

3.2.5 The Environmental Co-ordinator will be responsible for the management of any environmental related complaints through received through this mechanism. Such complaints will be recorded and all action taken logged through the use of a ‘Contacts Log’.
4. CONSTRUCTION ARRANGEMENTS

4.1 Construction Environmental Management Plan

4.1.1 A Construction Environmental Management Plan (CEMP) will be produced prior to construction works commencing. The CEMP will be focused upon the measures set out below but also set out specific control measures necessary to deliver the construction related requirements of this COPE.

4.1.2 The CEMP will set out the specific roles and responsibilities of the various personnel in managing, monitoring and controlling all sub-contractor(s).

4.2 Construction Site Housekeeping

4.2.1 Best practice construction site housekeeping should be applied at all times. This should include the following requirements:

a. Staff will be made aware of energy efficiency issues and measures to be implemented to reduce energy consumption;
b. Use of paper will be certified to the Forestry Stewardship Council (FSC) or equivalent standards;
c. Use of paper will be minimised and reused where possible and recycled paper purchased as a preference;
d. All working areas will be kept in a clean and tidy condition;
e. All site waste and litter will be collected at regular intervals, adequately contained and sorted for recycling where possible;
f. Measures to promote efficient use of water on the construction site will be adopted where possible;
g. All working areas will be kept in a clean and tidy condition;
h. Checks will be made to ensure that on-site toilets (if applicable) are connected to the foul sewer or that chemical toilets are disposed of appropriately;
i. Spill kits will be retained on site and maintained; and
j. Wheel washing facility areas will be provided for all vehicles and cleaned regularly.

Monitoring and Measurement

4.2.2 Details of the monitoring will be set out in the CEMP. Certain management plans in Appendix A to this document also outline the requirements for monitoring during the construction phase. Following these inspections a regular environmental performance report will be prepared by the Environmental Co-ordinator. The report will record data on compliance with the COPE and more detailed environmental management plans.

4.2.3 Any non-compliance identified through the monitoring will be documented by the Environmental Co-ordinator.

Fencing and Hoarding

4.2.4 So far as appropriate, all working areas will be sufficiently fenced off from members of the public and to prevent animals from straying on to a working area. Hoardings will be selected to suit the location but may include the following:

a. A wire mesh fence, where appropriate for minimum security needs; or
b. A 2.4 m minimum height, plywood faced, timber framed boundary hoarding, of a surface density of not less than 7 kg/m² or other hoarding providing equivalent security and noise attenuation, in the vicinity of noise sensitive neighbours; or

c. Other designs where a particular appearance or acoustic rating is considered to be required and as agreed with the LPA.

4.2.5 More details of noise mitigation are provided at Section 13. The location and design of site boundaries, hoarding and temporary structures on the public highway should permit adequate visibility at junctions and appropriate forward visibility along highways in accordance with Department for Transport advice and the requirements of the LPA.

4.2.6 Where hoardings are provided, they will be painted on the side facing away from the construction site in a colour and style to be approved by the LPA, include identification of the Project and contact information. All hoardings and boundary fences should be maintained in a neat and tidy condition. No advertisement, notice, etc. including illicit bill or fly posting will be permitted on any fence or hoarding. All graffiti, flyposting or defacement to the hoardings will be removed and made good or obscured within 48 hours of discovery.

4.2.7 An information board will be provided at each worksite detailing information on the site programme and estimated duration of the works, together with the web address and a 24 hour telephone number for use by members of the public who wish to lodge complaints or comments (see Section 4.2).

4.2.8 All temporary fencing and hoarding should be removed as soon as reasonably practicable after completion of construction works.

**Lighting and Visual Intrusion**

4.2.9 Construction buildings, equipment and lighting should be sited so as to minimise visual intrusion and light spillage at nearby residential properties, in so far as is consistent with the safe and efficient operation of each construction work site.

4.2.10 Site lighting should be positioned to minimise distractions or confusion to passing drivers on adjoining public highways. This provision should apply particularly to sites where work will be carried out after dark. 

4.2.11 So far as is practicable, all power to temporary traffic signals, lighting etc should be taken from mains supplies rather than from portable generators. Where portable generators are used, best industry practice should be followed to minimise noise and pollution from such generators.

**Access and Loading**

4.2.12 Lorries should enter and exit any construction work site in a forward direction, except where space restrictions do not permit this. If the reversing of vehicles into public spaces is required, then the movement should be properly controlled by a responsible person observing the rear of the vehicle. The sounding of audible reversing alarms will not be permitted outside normal working hours, except where this has been approved by the LPA in connection with works permitted under Paragraph 4.2.28.

4.2.13 All loading and unloading of vehicles should take place off the public highway so far as is reasonably practicable.
Site Security

4.2.14 Adequate security will be imposed by the Concessionaire to protect the public and prevent unauthorised entry to or exit from construction work sites. Site gates will be closed and locked when there is no site activity and proper security measures will be implemented.

4.2.15 Where site security cameras are used they should be placed in locations which will not impinge upon the privacy of local residents.

Clearance of Site on Completion

4.2.16 All working areas and accesses will be cleared and cleaned.

4.2.17 All surplus soil and materials, temporary roads and hardstandings, plant, sheds, offices and temporary fencing will be removed, post holes filled and the surface of the ground restored to as near as practicable to its original condition, to such condition as has previously been agreed with the land owner and/or the LPA or as required by the works comprised in the Project.

Pest Control

4.2.18 The risk of infestation by pests or vermin will be minimised by adequate arrangements for the disposal of food waste or other material attractive to pests. If infestation occurs such action will be taken to deal with it as required by the LPA as the Council’s Environmental Health Officer.

Safety

Emergency Contacts and Procedures

4.2.19 Emergency Contact Procedures will be maintained for each construction work site and will be displayed prominently at each site. These procedures will be followed in any site emergency.

4.2.20 They will contain emergency phone numbers and the method of notifying the emergency services and the Council in case of emergency. Copies of the procedure will be issued to the Council, the Fire Brigade, the Police, the Ambulance Service and other relevant statutory authorities.

4.2.21 Emergency telephone numbers for key personnel will also be included.

Contaminated Materials (Special Precautions)

4.2.22 At those sites where contaminated material is encountered, the Safety Officer will ensure that a Workers’ Safety Information Sheet is prominently displayed in rest/mess rooms and wash rooms covering hygiene, work practices, clothing requirements etc.

4.2.23 General provisions concerning remediation and disposal of contaminated materials are described in Section 10 and 11 of this document.
Crane Arcs

4.2.24 Crane arcs will be confined within the construction work site boundaries.

Material and Waste Storage

4.2.25 The following measures will be adopted, unless agreed otherwise with the LPA, when managing material and waste stockpiles at construction work sites:

a. Storage areas will be clearly marked;
b. Materials will be stored in suitable containers that are appropriately labelled with fitted lids, taps and tops in good condition;
c. Control measures will be put in place and/or spill response kits/materials will be located near to bulk stores;
d. Materials will be stored and protected against breakage, vandalism, theft or inundation/flood damage;
e. Topsoil will be stored in piles of less than 2m high to prevent damage to soil structure;
f. Different grades of soil and waste types will be separated;
g. So far as possible having regard to the nature of the works materials will be stored away from sensitive environmental receptors such as watercourses; and
h. Materials will be stored away from main site access roads.

Working Hours

4.2.26 Normal hours of work for construction of the Project will be Monday to Friday 0700 to 1900 hours and Saturday 0700 to 1300 hours. These hours of work will not apply to equipment which is required to operate continuously.

4.2.27 In certain circumstances different working hours will apply. These will be agreed between the Concessionaire and the LPA. Application for approval of any working arrangements for works outside normal hours should be made at least two weeks in advance except in an emergency.

4.2.28 Where Sunday or evening/night working has the potential to disturb people living and working nearby occupiers will be notified seven days in advance, providing a description of the work to be carried out, measures that will be taken to control noise or other disturbance and the proposed hours of working.

4.2.29 The LPA will be informed of any emergency works outside normal or agreed working hours.
5. HYDRODYNAMICS

5.1 Management and Mitigation

5.1.1 All temporary construction works undertaken as part of the Project and sited within the Upper Mersey Estuary will be removed within three months of the end of the construction of any relevant phase.

5.1.2 Measures required to mitigate construction and operational ecological effects on habitats within the Upper Mersey Estuary are discussed at Sections 7 and 8 (Avian and Terrestrial Ecology) in detail.

5.2 Monitoring

5.2.1 Appendix A1 sets out a plan for hydrodynamic monitoring that will be implemented before, during and after completion of construction of the Project. This plan has been developed in consultation and agreement with the Acting Conservator of the River Mersey (ACRM), the Environment Agency (EA) and Natural England (NE).
6. SURFACE WATER QUALITY

6.1 Management and Mitigation

6.1.1 The following plans will be prepared to ensure that the effects of the Project on surface water quality receptors are managed and mitigated throughout the Project’s construction and operation:

a. Pollution Control and Contingency Plan (including cofferdam dewatering) and
b. Water Management Plan (Surface and Groundwater).

Physical Management Techniques

6.1.2 Physical techniques will be employed during construction of the Project to protect surface water quality which will include, but not be restricted to, the following techniques:

a. All fuel storage will occur within bunded fuel tanks with a bund capacity of over 110% of the tank volume. These tanks will be properly maintained and have fuel filler facilities within the tank. A minimum volume of fuel will be stored on site. The location of all fuel storage will be such that it minimises the risks to surface and groundwater;
b. Construction compounds will be hard surfaced where possible with self contained surface water collection and management systems;
c. Oil/water separators will be used on construction compound surface water management systems to remove oils and fuels accidentally spilled/accumulated during construction of the Project. These will be maintained in accordance with the manufacturer’s instructions to ensure they remain efficient;
d. Bunded areas for the waste storage and separation. Stockpiles of contaminated or suspect material will be sheeted to minimise runoff;
e. Spill mats and drip trays will be used with containers wherever necessary;
f. Measures to prevent the reintroduction of suspended solids into watercourses will be incorporated into temporary works such as earthwork areas, haul routes and compounds. No exposed stockpiles will be located within an agreed distance of principal water courses;
g. All contaminated groundwaters will be collected and stored prior to monitoring and disposal. Appropriate disposal techniques will be used in accordance with the Environmental Protection (Duty of Care) Regulations 1991 (Statutory Instrument No. 2839), known as the “Duty of Care Regulations” hereafter;
h. No storage of contaminated soils will occur within 20m of principal water courses unless this is on dedicated engineered and bunded areas. Contaminated waste will be stored for a minimum time prior to removal for management and disposal;
i. Surface runoff should be stored and monitored in accordance with the requirements of discharge consents negotiated with the EA; and
j. Any wheel washers used in site compounds will have self contained water collection systems and these waters will be monitored prior to discharge.

6.1.3 For works within the River or Estuary physical measures will be used to minimise the release of sediments. These will include the use of silt nets during piling activities.

6.1.4 For the infilling of the St Helens Canal for use by construction plant to access the saltmarsh a chemically inert stone will be used such as granite or shale to minimise the release of fines into the water column. In addition to this the stone will be pre-washed in a controlled area (i.e. away from sensitive areas such as watercourses) to remove any fines prior to infilling the canal.
6.1.5 During construction work on culverts in Bowers Brook and Stewards Brook, the brooks will be overpumped to ensure the working area is dry, which will minimise the risk of contamination.

**Control and Management of Surface Water Runoff and Drainage**

6.1.6 Prior to commencement of each phase of the development details of the drainage works to be carried out in accordance with an approved drainage strategy will be submitted to and approved in writing by the LPA.

6.1.7 Appropriate design standards will be used, such as the EA Pollution Prevention Guidelines\(^1\) and DMRB\(^2\), for all temporary and permanent works.

6.1.8 Balancing ponds and swales will control the flow of runoff into the designated watercourses and minimise the potential for scour of sediments and input of suspended sediments from routine road runoff. The exact location of these facilities is to be confirmed by the Concessionaire in the detailed design. However, at present it is proposed to provide two balancing ponds at the Main Toll Plaza’s on the former St. Michaels Golf Course, a swale south of the Widnes Loops and a balancing pond at the Lodge Lane Junction, which will discharge into Flood Brook. These features will be fitted with spill and pollution control equipment to deal with possible accidents in these locations, the details of which will require the prior approval of the LPA.

6.1.9 Interceptors and filter drains will be used to minimise any pollutant input from routine runoff and spillage of chemicals from roads into surface water courses. The locations of these features have not been designed at this stage. However, they will be located at key locations of the Project such as the main toll plaza.

6.1.10 Routine highway runoff will be discharged into Stewards Brook, St Helens Canal and Flood Brook. All runoff entering the watercourses should pass through a series of control measures in order to remove pollutants and to attenuate flows. These should include:

a. Oil traps;
b. Interceptors;
c. Baffle boards;
d. Check dams;
e. Scum boards;
f. Vegetated swales;
g. Balancing Ponds; and
h. Penstocks.

6.1.11 The existing sewer system (storm or foul) should not be used for surface water drainage from the Project.

\(^1\) The EA have produced a series of Pollution Prevention Guidance notes (known as PPGs), which provides practical advice to help avoid causing pollution, minimise waste and comply with the requirements of the law.

\(^2\) Design Manual for Roads & Bridges (DMRB) - This standardised method provides an indication of the risk of an accidental spillage causing a pollution impact on a receiving watercourse.
6.1.12 Mitigation should be in place to control the migration through groundwater of existing chlorinated solvent contamination reaching Bowers Brook, to minimise impact to the Estuary. This comprises source reduction techniques (in line with recommendations for mitigation set out for contamination in Section 10): the existing drainage beneath Catalyst Trade Park area is to be stopped off prior to the construction of the Widnes Loops Junction. It is envisaged that the construction of the Widnes Loops Junction will use a grid of vibro-concrete columns to improve the ground.

6.1.13 Other techniques to minimise the migration through groundwater of chlorinated solvents entering Bowers Brook may include measures such as a physical barrier constructed in the ground between Catalyst Trade Park and Bowers Brook extending 4-5m below ground level. The details of measures actually deployed will require the prior approval of the LPA and will be developed in line with principles set out in Section 10 of this COPE.

6.1.14 The removal of an access track built along the saltmarsh will be avoided during the highest annual spring tides that inundate the saltmarsh. This will minimise the risk of loose material being washed into the estuary.

6.2 Monitoring

6.2.1 Appendix A2 sets out a plan for surface water quality monitoring that is to be implemented before, during and after construction of the Project. This plan has been prepared in consultation and agreement with the ACRM, EA and NE.
7. AVIAN ECOLOGY

7.1 Management and Mitigation

7.1.1 Avian, terrestrial and aquatic ecology mitigation will be delivered through the implementation of the Biodiversity Management Plan (BDMP, B4027/BDMP/R01, Appendix B). In addition to the details set out below, which will be developed in any event as part of the Project, the BDMP will set out all mitigation that is required to meet the codes of best practise set out in this document, protect ecological features likely to be affected by the construction and operation of the Project, ensure compliance with wildlife legislation and satisfy requirements of statutory bodies.

Upper Mersey Estuary LWS

7.1.2 To ensure the protection of habitats and birds within the Upper Mersey Estuary Local Wildlife Site (LWS) a package of essential mitigation has been developed in consultation with NE and the EA.

7.1.3 This essential mitigation requires the management and restoration of saltmarsh habitats within the Upper Mersey Estuary LWS and their conversion to more favourable feeding and roosting habitat for wildfowl and wading birds. This mitigation will be achieved through a combination of habitat creation and habitat modifications. This essential mitigation will be implemented through the adoption of detailed measures which will require the prior approval of the LPA.

7.1.4 The key principles of the essential mitigation to be implemented in the LWS during the construction of the Project will include the following:

a. Saltmarsh access by machinery will be restricted to access tracks and (subject to paragraph (b) below) there is to be no access by personnel to bird-breeding habitats in the bird-breeding season of March to August inclusive. Fencing and/or other appropriate measures will be used to prevent deliberate or accidental access;

b. If the construction and/or use of access tracks across the saltmarsh is required to commence within the bird-breeding season, vegetation will be cut short and maintained in that condition within the construction traffic routes and directly underneath the New Bridge construction area to create a sterile environment for ground nesting birds. Marker posts at 15 metre interval intervals will also deter ground nesting birds from moving into this area;

c. Temporary fences will be erected to demarcate and prevent machinery and personnel access to areas of saltmarsh bird-breeding habitat;

d. Lighting required during construction will incorporate the use of directional and screened lighting to avoid glare so far as it is safe and practicable to do so;

e. There will be ecological monitoring and surveillance of the saltmarsh habitats and breeding birds throughout the construction of the Project. If temporary access for site investigations or other construction-related activities is necessary, ecological advice and survey information on breeding bird locations should be obtained beforehand. The method of obtaining such access will have regard to such advice;

f. Shooting rights on the estuary edge to the saltmarsh mitigation areas will be suspended within the 300 metre construction corridor measured from the proposed centre line of the New Bridge; and

g. Protected areas are to include saltmarsh on both sides of the Upper Mersey Estuary so that if birds are disturbed on one side of the Estuary, they will have alternative and similar feeding and roosting habitats nearby, well within a short flying distance.
7.1.5 The essential mitigation to be implemented in the Upper Mersey Estuary LWS during the operation of the Project should include the following:

a. Cut saltmarsh vegetation should be managed by conservation cattle grazing to convert the vegetation to a range of saltmarsh plant communities known to be favoured by feeding and roosting wildfowl and wading birds, specifically those species whose populations in the European Site are of international importance. Grazing densities should be controlled so that saltmarsh vegetation is reduced to an appropriate height to avoid over-grazing that could result in localised losses of saltmarsh vegetation and increased risk of sediment erosion;

b. Saltmarsh scrapes and pools will be created in close proximity to the bridge alignment by excavation in conjunction with an artificial liner or other methods of water retention. The pools and scrapes will be of different sizes and shapes but all will be shallow and no more than 1.5 metres deep. They will have shallow margins and, in some cases, deeper central water areas. The pools will be separated by wide gaps to avoid pools merging. They will be created well away from the eroding channel margins of the saltmarshes and well separated from major creeks. The scrapes are intended to provide a wide range of habitats for marine and brackish water invertebrates that are the invertebrate prey of the bird species of the internationally important wildfowl and wader populations of the SPA;

c. Conservation and vegetation management of the natural system of saltmarsh creeks will be undertaken, including reed colonisation and reedbed management, as part of an integrated scheme intended to create favourable saltmarsh habitat for wintering and migratory wildfowl and wading birds;

d. The construction period fenceline will be upgraded to protect saltmarshes from disturbance by people and dogs. This will help to protect ground nesting birds during the breeding season, as well as providing sanctuary in winter for wildfowl and wading birds;

e. Shooting rights on the saltmarsh mitigation areas that were suspended within the 300 metre construction corridor, will be allowed back to within 200 metres of the centre line of the New Bridge during the operation period;

f. Access to higher ground will be provided for grazing livestock to obtain safe refuges during high tides and stormy weather. There will be facilities to allow livestock to be removed from the saltmarshes at times when tidal flooding of the saltmarshes is expected;

g. Improved areas will include saltmarsh on both sides of the Upper Mersey Estuary so that if birds are disturbed on one of the areas, they will have alternative and similar feeding and roosting habitats nearby, well within a short flying distance;

h. The saltmarsh mitigation areas will encompass habitat on both sides of the new Bridge at both Astmoor and Widnes Warth saltmarshes which will be continuous beneath the bridge and connected by creeks, saltmarsh vegetation, pools and intertidal sand and mudflats;

i. Both mitigation areas will be close to Runcorn Sands which has supported saltmarsh vegetation in the past, and is likely to be colonised by similar saltmarsh vegetation in the future, albeit temporarily. The presence of Runcorn Sands, particularly if saltmarsh recolonisation occurs, will increase the ornithological value of the mitigation areas by providing additional bird-feeding habitat and potential roosting habitat;

j. The Astmoor mitigation area will be adjacent to Wigg Island Community Park and very close to the visitor centre. This location will promote the value of Wigg Island Local Nature Reserve; and

k. The Widnes Warth mitigation area will be easily accessible from Spike Island and at a location where hides can be provided to allow local people and visitors to study and enjoy new landscape provided by the mitigation and the birdlife that it will attract;
Avoidance of Bird Breeding Season

7.1.6 Vegetation clearance required as part of the construction of the Project will be carried out outside the breeding season (March to August inclusive) where possible. Where this is not possible all clearance will be preceded by an inspection by a competent ornithologist. Where nesting birds are identified they will be protected from damage until the young have fledged.

7.2 Monitoring

7.2.1 Appendix A3 sets out a plan for ecology monitoring that will be implemented within the LWS before, during and after construction of the Project. This plan has been prepared in consultation and agreement with NE and the EA.
8. TERRESTRIAL ECOLOGY

8.1 Management and Mitigation

8.1.1 As set out above at Paragraph 7.1.1 all terrestrial ecology mitigation will be delivered through the implementation of the BDMP.

Upper Mersey Estuary LWS

8.1.2 The package of essential mitigation that will be implemented to protect the Upper Mersey Estuary LWS habitats is set out above at Paragraphs 7.1.2 to 7.1.6. This package will mitigate both construction and operational effects on the estuarine habitats.

8.1.3 Following removal of construction access roads and cofferdam working areas there are several potential methods for saltmarsh vegetation restoration. The chosen methodology, which will be subject to the prior approval of the LPA, will be set out in the BDMP. Options include the following:

a. Loosening of compacted soil, cultivation and planting with an appropriate seed mix;
b. Encouraging natural recolonisation by seed released from adjacent saltmarsh vegetation through tilth, seedbank germination and possible fertiliser application;
c. Translocation of affected saltmarsh vegetation to a holding area;
d. Restoration of work areas to saltmarsh vegetation; and
e. Possible translocation of stripped turf from other areas of restoration areas to access track routes and/or cofferdam areas following infilling.

Wigg Island LWS

8.1.4 During operation of the Project tree and shrub planting will be implemented along both sides of the New Bridge crossing of Wigg Island to minimise the reduction in aesthetic and intrinsic appeal of the Community Park. This planting will use tall and fast-growing tree species. To encourage fast growth the soil conditions are to be improved through physical and organic means. This habitat will be managed during operation to maximise its screening effect and suitability as bird-breeding habitat.

St Helens Canal LWS

8.1.5 A water vole survey will be undertaken within the proposed works area along the banks of St Helens Canal to ensure water vole absence prior to commencement of the works likely to affect the St Helens Canal.

8.1.6 To compensate for operational effects of vegetation shading by the New Bridge suitable ponds and linear aquatic habitats will be provided on Wigg Island. These aquatic habitats will be designed to support types of flora and fauna found in the canal. The details of this mitigation will be outlined in a BDMP as described at Paragraph 7.1.1.
Manchester Ship Canal LWS

8.1.7 Orchid colonies and Grass Vetchling within the Manchester Ship Canal LWS will be identified prior to commencement of construction through a vegetation survey which will be carried out during May to July inclusive. Where orchids, Grass Vetchling and other important plant species (such as those supporting breeding butterflies) are found they will be protected using protective fencing. Where protection is not practicable, such plant species will be translocated to a suitable receptor site elsewhere along the canal bank or in Wigg Island LWS following preparation of the relevant translocation sites. More details regarding such mitigation will be set out in a BDMP as described at Paragraph 7.1.1.

8.1.8 Soil located beneath the New Bridge will be treated following construction to allow natural plant recolonisation in line with methods which are to be set out in a BDMP as described at Paragraph 7.1.1.

8.1.9 As described at Paragraph 8.1.7 vegetation, containing larval food plants for butterflies and invertebrates and which is likely to be affected by construction of the Project will be translocated to a suitable receptor site. Following construction, soil will be treated by methods to be set out in a BDMP to encourage natural recolonisation.

Great Crested Newts at Rocksavage

8.1.10 Great Crested Newts and their habitat are protected under European and National legislation. A detailed Great Crested Newt Method Statement will be prepared as part of the BDMP to mitigate any impact on Great Crested Newts or their habitat at Rocksavage. This mitigation will include the erection of newt fencing along the boundary of the land adjacent to the works. A European Protected Species mitigation licence must be sought from NE to permit the works at this location.

Bat Populations

8.1.11 Bats and their habitat are protected under European and National legislation. Prior to construction, and during the appropriate survey season, a survey of all potential bat roosts in buildings for demolition will be undertaken. Depending on the results of this survey and where necessary, appropriate mitigation measures will be set out in the BDMP and a European Protected Species mitigation licence must be sought from NE to permit the works at this location. Such mitigation measures may include demolition during appropriate seasons and provision of alternative suitable bat roosting habitat.

8.1.12 Areas of suitable bat foraging and commuting habitat will be retained across the Project area where practicable during construction. The location and extent of bat habitat to be safeguarded will be set out in detail in the BDMP.

8.1.13 Sensitive lighting techniques will be used during construction and operation to ensure minimal effects on bat movements in the study area. Such mitigation should include the use of directional lighting design and low light emitting specifications.
**Water Voles**

8.1.14 Water voles and their habitat are protected under European and National legislation. A water vole survey will be undertaken prior to construction to identify potential water vole recolonisation. Based on the findings of the water vole surveys, water vole Method Statement will be prepared as part of the BDMP to mitigate any impact on water voles or their habitat. Based on the survey results, and where necessary, a European Protected Species mitigation licence will be sought from NE to permit the works at this location.

8.2 Monitoring

8.2.1 As stated at Paragraph 7.2.1 Appendix A3 sets out a framework for ecology monitoring that will be implemented within the Upper Mersey Estuary LWS pre, during and post construction of the Project.

8.2.2 Ecological surveillance will be undertaken during the construction of the Project. The details of this surveillance will be set out in detail in the BDMP.

8.2.3 A detailed programme of terrestrial ecology monitoring will be set out within the BDMP to determine the success of mitigation outlined at Section 8.1 above. This will comprise vegetation, habitat and protected species surveys to monitor the success of mitigation and species activity following Project construction.
9. **AQUATIC ECOLOGY**

9.1 **Management and Mitigation**

9.1.1 A number of measures will be adopted during the construction of the Project to ensure protection of aquatic ecology receptors. These measures will be detailed in the **CEMP** and the **BDMP** and will include, but not be limited to, the following:

a. Use of low-noise emitting methods and equipment (such as vibro-piling) for in water piling activities where possible;
b. Monitoring of in-water noise levels (see Appendix A4) during construction with the aid of hydrophones;
c. Cessation of in-water piling works at appropriate times and where practicable, having regard to the nature of the works and the programme for their implementation, during peak periods of salmon migration (May for downstream salmon smolt migration, and August to October for adult migration upstream);
d. Sensitive timing of construction activities to take into consideration fish migration periods;
e. Establishment of a marine mammal safety zone during pile driving activities;
f. Management of sediment releases into the Estuary and watercourse in line with surface water quality mitigation measures (see Paragraph 6.1.3);
g. Implementation of construction phase monitoring in line with methods set out in Appendix A4;
h. Control of contaminant releases in line with measures set out in the Remediation Strategy (Section 10);
i. Disposal of waste in line with the Site Waste Management Plan (SWMP) as set out in Section 11; and
j. Sensitive design of temporary access routes to ensure maintenance of adequate fish passage routes.

9.1.2 As detailed in Section 6, appropriate design standards will be maintained during the operation of the Project in compliance with EA standards and waste legislation (Duty of Care Regulations) for surface water runoff and drainage to surface water features.

9.2 **Monitoring**

9.2.1 Appendix A4 sets out a framework for aquatic ecology monitoring that will be implemented pre, during and post construction of the Project.

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3 A Marine Mammal Safety Zone is a successful strategy operated by the National Marine Fisheries Service (NMFS) in the United States (US). It involves a patrol around an area where pile driving is being undertaken. Should a marine mammal be spotted the ground crews are alerted and works suspended until the mammal moves out of the area.
10. CONTAMINATION

10.1 Management and Monitoring

10.1.1 Prior to construction of the Project a Remediation Strategy will be prepared in respect of contaminated land, soils and groundwater within the development site. The Project Remediation Strategy will address all matters for mitigation and remediation of significant effects associated with contaminants and as identified in the ES (Chapter 14).

10.1.2 Options for remediation will be designed in accordance with applicable Department for Food and Rural Affairs (DEFRA), Environment Agency (EA) guidance and all other relevant guidance and legislation for contamination and will be compliant with the Environmental Protection Act 1990. The Remediation Strategy will be subject to approval by the LPA in consultation with the EA.

10.1.3 The Remediation Strategy will include the following elements:

a. Detail regarding implementation of remediation and mitigation measures on site will include details of the methods to be adopted and implemented in parallel with the remedial works to ensure that possible impacts are managed adequately;
b. Information on how the effectiveness of the mitigation measures will be verified on site during the construction and operation of the Project and any longer term verification measures that may be necessary;
c. Details of monitoring during the implementation of the mitigation measures to confirm that there are no adverse impacts from the remedial works themselves. In addition there will be a need for longer term monitoring to measure the efficacy of the remedial works; and
d. Detail regarding actions to be taken should monitoring indicate that any parameters are diverging from those anticipated in the Remediation Strategy.

10.1.4 The measures that may be included in the Remediation Strategy will include the following during construction and operation (including maintenance) of the Project. Exact requirements will be determined on a location-by-location basis and addressed in detail in the Remediation Strategy:

a. Use of good site management (including site security and measures to protect local residents and workers) and adoption of appropriate personal protective equipment by construction workers through implementation of a CEMP (refer to Section 4);
b. Adoption of watching briefs in sensitive works areas;
c. Minimisation of intrusive works where practicable;
d. Control of dust emissions in line with measures set out at Section 12;
e. Soil and groundwater remediation where appropriate;
f. Adoption of measures to prevent vertical migration of contaminants where considered necessary;
g. Light and dense non aqueous phase liquid remediation where appropriate;
h. Minimisation of exposure to contaminated soils;
i. Use of suitable fill in excavations and use of pipe materials not affected by contaminants in the Study Area;
j. Control and monitoring of odours and vapours;
k. Adoption of measures to manage accidental spillages and releases through the implementation of a CEMP (see Section 4);
l. Use of suitable soil thickness and type in areas of landscaping;
m. Use of the appropriate concrete class in contaminated areas;
n. Retention of existing foundations where practicable;
o. Back-filling of voids with low permeability materials;
p. Protection of surface water quality through measures outlined in Section 4 and 6;
q. Design of surface water drainage systems as set out in Section 6;
r. Disposal of wastes to a suitably licensed waste disposal facility as set out in Section 11;
s. A protocol will be produced to deal with unexploded ordnance. Monitoring will be required during excavations for the Bridge piers and towers for unexploded ordnance. If unexploded ordnance is encountered then work will need to be stopped until the object has been removed and made safe by suitably qualified specialist personnel;
t. Protocol to deal with unexpected contamination;
u. Removal or protection of existing drains where they form a pathway for contamination migration; and
v. Management of soils contaminated by radioactivity

10.2 Monitoring and Response

10.2.1 As detailed at Paragraph 10.1.3 (c) and (d) monitoring measures will be required during the construction of the Project and, if necessary, following completion of construction activities, to ensure that there are no adverse impacts from the remedial works themselves and to measure their efficiency. These monitoring measures will be set out in detail in the Remediation Strategy. The contamination monitoring strategy will also provide actions to be taken should monitoring indicate that any parameters are diverging from those anticipated in the Remediation Strategy.

10.2.2 On completion of remedial works in accordance with the Remediation Strategy a Verification Report will be prepared to demonstrate that the mitigation measures have been implemented. Should long term monitoring be required as part of the process, for example, associated with monitoring natural attenuation, then a series of Verification Reports will be required at regular intervals throughout this process.
11. WASTE AND MATERIALS

11.1 Management and Mitigation

11.1.1 Prior to construction commencing, a Site Waste Management Plan (SWMP) will be produced in accordance with the Site Waste Management Plans Regulations 2008 (Statutory Instrument No. 314) for approval by the LPA. The approved SWMP will be implemented during construction.

Implementation of Waste Management Hierarchy

11.1.2 All Project waste management activities will be undertaken in line with the Government’s Waste Hierarchy and Proximity Principles. This will encourage the reduction of waste volumes sent to landfill through adoption of alternative waste management methods under the hierarchical scheme; minimise, reduce, reuse and recycle. Furthermore, management and disposal of waste arisings will be undertaken as close as possible to the origin of waste sources.

11.1.3 In order to mitigate the effects of waste management, waste resources will form part of the SWMP. This element of the SWMP will contain details which may include the following:

a. Ticketing of all loads of material generated on site. This will include a description of the location of arising and details of the nature of the material;
b. Storage requirements for wastes in the quarantine, pre-treatment and general storage areas on the site;
c. Transport arrangements for all materials exported from site, including sheeting requirements, routes to be used, waste transfer notes, Waste Acceptance Criteria (WAC) test results and destination;
d. Pre-treatment of hazardous waste materials to extract non-hazardous waste for re-use on site or export to off-site recycling facilities;
e. Engagement with the local waste management industry to divert Project non-hazardous waste from landfill to local recycling facilities wherever possible;
f. Any special requirements or difficult wastes; and
g. Details of waste management roles and responsibilities.

11.1.4 Due to the interaction between waste management and other disciplines, effects resulting from Project waste activities will also be managed through measures proposed within other discipline management plans. Measures to manage and minimise the effects of waste generation from the Project are also contained within the following plans:

a. Water Management Plan (Surface and Groundwater);
b. Air Quality Management within the CEMP;
c. Remediation Strategy; and
d. Pollution Control and Contingency Management Plan.

11.1.5 Physical measures to minimise effects of waste management may include:

a. Use of bunded hard surfaces on the waste quarantine and waste pre-treatment areas;
b. Use of bunding around waste storage areas;
c. Storage of wastes in locations on the compounds taking into account the location of nearby sensitive receptors;
d. Sheeting of waste stockpiles in the quarantine and pre-treatment areas;
e. WAC testing of waste materials to understand the nature of the material and handling requirements; and
f. Appropriate signage and access control to waste storage areas.

11.1.6 An environmental induction and tool box talks will be provided to all Project staff including training and awareness on waste management issues.

11.1.7 Excavated galligu will be treated by blending with cement based additives to form structurally stable non leachable material for reuse on site.

11.1.8 Separate receptacles will be provided for different waste streams in order to allow wastes to be pre-treated prior to disposal. Waste segregation should take place at source, where practicable and appropriate with immediate removal from site in order to minimise double handling of waste, reduce the potential for emissions and minimise land take used for waste activities. Pre-treatment requirements for wastes, under The Hazardous Waste (England and Wales) Regulations 2005 (Statutory Instrument No. 894) and EA guidance⁴ will apply.

11.1.9 Where materials are recyclable, materials should be taken to a dedicated waste management centre or via a contract with third party recycler(s).

11.1.10 Waste management activities should be undertaken in line with good practice guidance. Guidance documents are available for the management, monitoring and reporting of construction waste in order to improve resource efficiency and implement mitigation measures. Current sources of information for good practice guidance include:

a. The Waste and Resources Action Programme (WRAP) Construction Sector resources (www.wrap.org.uk/construction);

b. The Building Research Establishment (BRE) SMARTWaste Benchmarking initiative and DEFRA funded project (www.smartwaste.co.uk/benchmarking.jsp); and


11.2 Monitoring

11.2.1 Information regarding the total volume and classification of waste streams resulting from Project activities will be collated throughout the construction of the Project. Any changes to design of construction methods will then be incorporated into a revised SWMP.

11.2.2 In line with the Environmental Protection (Duty of Care) 1991 Regulations (Statutory Instrument No. 2839) all wastes will be monitored using specified procedures for waste description, transfer, treatment and disposal.

11.2.3 A Waste Management Licence will be needed for pre-treatment activities. Should existing merchant facilities not be used so that materials are treated on-site, an Integrated Pollution Control (IPC), permitting procedures licence will be required.

11.2.4 Monitoring and reporting requirements will be detailed within the SWMP, and may include the requirement for specialist monitoring of specific activities, such as piling operations.

11.2.5 Project waste arisings will be monitored against waste management objectives approved by the LPA in advance.

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12. AIR QUALITY

12.1 Management and Mitigation

Construction

12.1.1 Detailed management and mitigation to be implemented throughout construction of the Project will be contained within the CEMP.

12.1.2 A Project dust risk register will be developed and maintained throughout the construction of the Project. Those activities with the potential to emit dust and PM$_{10}$ using the BRE risk assessment publication ‘control of dust from construction and demolition activities’ will be identified. In order to minimise the effect of dust nuisance throughout the construction of the Project the following dust suppression measures will be implemented where required:

a. Damping down of exposed soils, loose materials or unmade surfaces close to sensitive locations during dry weather;
b. Sheetting of vehicles transporting earthworks material to or from site;
c. Limiting vehicle speeds over unmade surfaces;
d. Controls will be applied to the cutting and grinding of materials;
e. Burning of materials will be prohibited;
f. Cleanable hard standing will be provided;
g. Wheel washing facilities will be provided where appropriate;
h. Sweepers will be used regularly on local roads if visible amounts of soil material from the works are carried into the public highway;
i. Haul roads should be located away from off-site sensitive properties as far as practicable and to be watered regularly (wet suppression of dust);
j. Where possible, all site vehicles and plant should have upward facing exhaust to minimise surface dust re-suspension;
k. Bunds or screens may be constructed as wind breaks, to reduce wind speeds. Earth bunds would be seeded as soon as possible, prior to which they should be maintained damp;
l. Any aggregate stocking areas should be located away from sensitive areas and residential properties as far as practicable;
m. Stockpiles should also be watered and where necessary they should be covered;
n. Off-site vehicles should have their wheels and bodies cleaned on a regular basis and the access roads should be hard-surfaced and maintained damp;
o. Permanent roads should be paved as early as practicable;
p. Drop heights should be minimised and chutes used to discharge material close to where it is required;
q. Consolidation and bulking of wastes so as to minimise transportation and handling requirements;
r. No vehicle or item of equipment emitting visible black smoke (other than during ignition) should be used on any construction site or public highway;
s. Combustion engines on all plant and equipment should not be left running unnecessarily;
t. Vehicle exhausts should be placed as far from sensitive properties as practicable;
u. Clear signing of construction vehicle access routes will be provided;
v. Screening and/or wrapping of buildings which are to be demolished to reduce dust emissions where necessary;
w. Demolition activities will use methods to minimise emissions of dust including the use of water sprays to suppress dust; and
x. Fitting dust control devices to equipment which may include wet suppression methods and local exhaust ventilation.
12.1.3 Targeted planning and identification of dust sources should be undertaken through the use of checklists provided in the Building Research Establishment's 'Control of Dust from construction and demolition activities'.

**Sensitive Construction Traffic Management**

12.1.4 The following construction traffic management measures should be implemented to minimise adverse effects to local air quality resulting from construction traffic exhaust emissions.

a. Where possible, all non-road mobile machinery (NRMM) should use fuel equivalent to ultra low sulphur diesel (ULSD);

b. All NRMM should comply with either the current EU Directive Staged Emission Standards (97/98/EC, 2002/88/EC, 2004/26/EC) now transposed into UK regulations;

c. NRMM with power outputs greater than 37kW should be fitted with suitable after-treatment devices stated on the approved list managed by the Energy Saving Trust;

d. No vehicles or plant should be left idling unnecessarily;

e. All vehicles and plants should be well maintained and regularly serviced according to the manufacturers recommendations;

f. Vehicle exhausts should be placed as far from sensitive properties as practicable;

**g.** Existing power sources should be used rather than temporary power generators;

**h.** Haul routes should be located away from off-site sensitive properties with appropriate speed limits enforced;

i. The use of consolidation centres to manage site deliveries and handling requirements should be considered; and

j. Where construction works are located near to waterways and/or railways, delivering and removing materials from the site using these means, rather than by road should be considered.

12.2 Monitoring

12.2.1 In order to define baseline pollutant concentrations prior to and during construction both continuous and non-continuous monitoring stations will be employed. Baseline monitoring sites would be established 3 months prior to construction works commencing (or at a time agreed by the LPA) in order to provide information on the local baseline near to sensitive receptors. The baseline construction monitoring would be used establish “action levels” for each pollutant. These action levels are usually set at a precautionary level below the relevant air quality standard or objective, or at a level that is agreed to be an acceptable increase above the construction baseline.

12.2.2 Monitoring during construction will be assessed against these action levels and the CEMP will require that procedures are reviewed and action is taken to reduce levels to below the action levels. The procedures would be agreed within the CEMP and ensure that monitored pollutant concentrations reduce below the action levels.

12.2.3 Monitoring of the effects of operation of the Project on NO₂ and PM₁₀ concentrations will be undertaken at locations to be agreed with the LPA. Suitable monitoring sites previously established throughout the construction phase of the Project would provide ideal locations at which to continue monitoring the long term effects.
**Deposited Dust Monitoring**

12.2.4 Existing levels of dust will be monitored within 200m of construction areas. Monitoring locations during construction would be agreed in writing with the LPA and would include locations within 50m of the construction areas F (Bridgewater Junction), Area G (Central Expressway, Lodge Lane and Weston Link junctions), and Area I (SJB and Widnes De-Linking). Deposited dust levels will be monitored using one or more of the following options or an alternative approved by the local planning authority in advance;

a. Depositional Dust Gauges  
b. Adhesive Strips  
c. Glass Slides

**NOx and PM\textsubscript{10} Monitoring**

12.2.5 Concentrations of NO\textsubscript{x} and PM\textsubscript{10} will be monitored through the use of continuous analysers at a minimum of three locations. These locations will be agreed with the LPA and would include:

a. On the Central Expressway, Runcorn;  
b. North of the River, adjacent to those properties most affected by the SJB; and  
c. South of the SJB

12.2.6 Typical continuous PM\textsubscript{10} monitoring will employ one or more of the following options or an alternative approved by the LPA in advance of construction works commencing;

a. Tapered Element Oscillating Microbalance (TEOM)  
b. Tapered Element Oscillating Microbalance Filter Dynamic Measurement System TEOM-FDMS  
c. Met-one Beta Attenuation Monitor (BAM)  
d. Opsis SM200

12.2.7 Monitoring of NO\textsubscript{2} will also be undertaken using NO\textsubscript{2} diffusion tubes with a triplicate co-location positioned at the LPA’s continuous analyser. Details of the monitoring regime will be approved by the LPA in advance of construction works commencing.

**Other Pollutants**

12.2.8 Monitoring of metals (e.g. arsenic, cadmium, nickel and lead) will be undertaken using appropriate techniques and analytical methods, under timescales to be agreed with the LPA, based on sampling of PM\textsubscript{10}.

12.2.9 Monitoring of other pollutants as required will be identified for Health and Safety and under the contaminated land Remediation Strategy.
**Meteorological Data**

12.2.10 Local meteorological data will be recorded at strategic locations to the north and south of the Mersey Gateway and relative to those construction areas with the longest construction phases e.g. construction of the New Bridge in the inter-tidal zone. Meteorological data should specifically measure wind speed, wind direction and rainfall.

**Odours**

12.2.11 Measures for odour control will be incorporated within the CEMP and approved by the local planning authority in advance. The CEMP will contain details such as odour testing locations within the vicinity of construction works.
13. NOISE

13.1 Management and Mitigation

Noise and Vibration Management Plan

13.1.1 A Noise and Vibration Management Plan (NVMP) will be prepared for incorporation into the CEMP. This plan will include best practice on the control and management of noise and vibration including specification of noise and vibration targets and trigger levels and limits on hours of working for certain activities in certain areas to manage and mitigate adverse effects of the Project on sensitive receptors. Measures which will be included within the plan should include the following:

a. Where noisy tasks have to be undertaken close to occupied buildings, the occupiers would be given advance notice, in writing, explaining the reason for the works, the expected time and duration of the works, and the procedures to be adopted for minimising the noise or vibration;

b. All plant and equipment associated with the construction works should be properly maintained, provided with effective silencers and operated in such a manner as to avoid causing excessive noise emission. Where plant has been designed to operate with engine covers to reduce noise, these should be used and remain closed while the plant is in operation. Unless otherwise directed by senior construction management, items of plant in intermittent use should be shut down during idle periods;

c. Static plant should be located in areas as far from inhabited buildings as possible and should be screened where practicable. Plant known to emit noise predominantly in one direction should, when possible, be screened or orientated so that the noise is directed away from noise sensitive areas;

d. No music or radios should be played on site;

e. Audible warning systems, such as vehicle reversing sirens, would normally be set to as low a setting as is compatible with safety requirements. Where appropriate, broadband warning systems would be used;

f. Site compounds should be located as far as possible from local occupied premises and, where possible, site buildings should be situated to provide additional screening between the works and other occupied premises. Where appropriate, the stockpiling of site materials, soil or spoil should be located where it can provide some additional screening provided that any plant associated with this would in itself not generate nuisance and provided that prevailing wind conditions would not increase the potential for nuisance due to dust. The transport of materials on or off site by road should generally take place during the normal daytime working period and where possible should also be routed away from particularly sensitive receivers; and

g. Site personnel should be informed about the need to minimise noise to the neighbouring community as well as about the health hazards of exposure to excessive noise or vibration. Their training should include advice relating to the proper use and maintenance of tools and equipment, the positioning of machinery on site to reduce noise emissions to neighbouring communities, and the avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.

13.1.2 An application will be made to the LPA for a Section 61 agreement. This agreement will detail a noise control regime for construction works prior to construction commencing.
Working Hour Restrictions

13.1.3 Noise will be controlled through restriction on working hours and/or restriction on processes allowed in certain areas during construction. Night time working will be kept to a minimum.

13.1.4 Programming of noisy works near to schools will be undertaken where possible within the school holiday period.

Use of Noise Barriers and Prevention Measures

13.1.5 Noise barriers shall be erected in areas detailed within the ES and NVMP. Barriers will mitigate the effects of road traffic noise to sensitive receptors.

13.1.6 Under the Noise Insulation (Amendment) Regulations 1988 (Statutory Instrument No. 2000) noise insulation shall be provided to those properties which are defined under the regulations as being ‘seriously affected for a substantial period of time’.

13.2 Monitoring

13.2.1 Noise monitoring will be undertaken during construction in order to check noise and vibration level targets agreed within the Section 61 agreement, in line with British Standard 5228. Specific details regarding the frequency and locations of monitoring will be detailed within the NVMP.

13.2.2 Vibration monitoring of specific activities, such as piling, may be required.
14. TRAFFIC MANAGEMENT

14.1 Management and Mitigation

14.1.1 A Construction Transport Management Plan will be prepared and approved by the LPA prior to construction commencing. This requirement will be secured through Planning Condition 8.

Construction Traffic Routes

14.1.2 Construction traffic will be restricted to identified routes, which will be agreed with the police and highway authority prior to the commencement of the works. Particular conditions may apply in respect of hours of use, type of use, maintenance of routes (road sweeping etc).

Construction Traffic Parking

14.1.3 All construction vehicles not in use will be held at compounds within the works or at offsite locations provided by the Concessionaire.

Temporary and Permanent Closures and Diversions

14.1.4 Construction of the works will require temporary and permanent closures and diversions for road traffic.

14.1.5 The timing of all closures and diversions will be subject to approval by the police and highway authority. The Concessionaire will also be required to demonstrate the adequacy of the proposed measures to accommodate the diverted traffic, with respect to both capacity and design standards, including situations where elements of the permanent works may be brought into use before completion of the full scheme.

14.1.6 Indicative traffic management schemes for key areas of the works have been developed, and used to produce the indicative construction programme. These will be developed or replaced by the Concessionaire to reflect his anticipated sequence and timing of different parts of the works.

14.1.7 Before the development of each phase commences, details of the siting, design and layout of any new or altered vehicular access to the highway network (which will serve the works within that phase) and any highway junction improvements other than those shown on the Planning Direction Drawings, will be submitted to and approved in writing by the LPA (Planning Condition 14). Any works necessary to ensure highway safety will be completed before substantive construction activity served by such works or accesses is commenced during that phase.

Public Rights of Ways and Footways

14.1.8 Construction of the works will require temporary and permanent closures and diversions for pedestrians, cyclists and equestrians.

14.1.9 The timing of all closures and diversions will be subject to approval by the police and highway authority. It will also be necessary to demonstrate the adequacy of the proposed measures to accommodate the diverted trips, with respect to both capacity and design standards, including situations where elements of the permanent works may be used.
14.1.10 Prior to the commencement of each phase of the development, details of alternative access routes and/or diversions along the existing greenway, footway and cycle networks within that phase will be submitted to and approved in writing by the LPA (Planning Condition 15). The temporary and permanent closures of any street permitted by the Order will not be implemented until the designated alternative or diversion routes are available. Temporary closures will be for no longer than is necessary to enable the works to be undertaken, unless otherwise agreed in writing by the LPA.

**Public Transport**

14.1.11 Construction of the works will potentially require temporary and permanent closures and diversions of some public transport routes.

14.1.12 The timing of all closures and diversions will be subject to approval by the police, highway authority and public transport operators. It will also be necessary to demonstrate the adequacy of the proposed measures to accommodate the diverted trips, with respect to both capacity and design standards, including situations where elements of the permanent works may be used.

**Maintenance and Repair**

14.1.13 All diversionary routes which are part of the Project, will be maintained to the appropriate standards during construction or maintenance.

14.1.14 The Concessionaire will liaise with the highway maintenance authority to ensure works are coordinated.

**Sustainable Transport Strategy**

14.1.15 The Concessionaire will:

   a. Implement a Travel Plan for staff employed on the project (Planning Condition 9). Prior to the development being opened to traffic a Workplace Travel Plan will be submitted to and approved in writing by the LPA. The development will be operated in accordance with the Plan unless otherwise agreed in writing by the LPA;

   b. Consider the sustainable transport implications in selecting materials and suppliers for use on the project; and

   c. Be aware of the Council’s sustainable transport objectives, and consider these in the design and operation of temporary diversions.
MERSEY GATEWAY PROJECT
DRAFT HYDRODYNAMIC MONITORING PLAN

C O N T E N T S

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   1.1 Proposed approach................................................................................................... 2
2. PROPOSED ESTUARINE MONITORING ......................................................................... 4
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Appendix 1: Summary Monitoring Plan
Appendix 2: Exemptions Plan Process
Appendix 3: Draft Monitoring Programme
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 Construction and Operation code of Practice for Environmental management (COPE) has been developed for the Project to define the measures required to mitigate and monitor the construction and operation of the Project 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 ES.

1.1.3 In considering the applications and ES, the Acting Conservator for the River Mersey (ACRM), 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 hydrodynamic processes.

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

1.1.5 The Hydrodynamic Monitoring Plan is expected to be delivered by the Concessionaire, who will construct the Project, on behalf of Halton Borough Council (HBC). This document comprises a draft proposal for the monitoring of the hydrodynamics of the estuary both during construction and for an appropriate period following completion of the construction. Its content will be the subject of agreements between HBC, the ACRM, EA and NE.

1.1.6 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.

1.2 Proposed Approach

1.2.1 Hydrodynamic monitoring will form a component of the Monitoring Plan for the Mersey Gateway Project, and will be integrated into monitoring proposed for other issues/disciplines, and which we expect will be delivered by the Concessionaire on behalf of Halton Borough Council. Hydrodynamic monitoring will be undertaken only in the area shown in Figure 1 ("the Study Area").

1.2.2 Six measures will be used to identify potential change to the stability within geomorphic/hydrodynamic systems of the Study Area (Figure 1). These proxy data (i.e. data which provides information on a range of hydrodynamic processes and change) consist of the following measures:

a. Aerial photographs: the aerial photograph survey has already been used to record channel change and the mobility of channels which is a characteristic of this area within the Mersey Estuary. This data provides a database of over 5 years information which will be used to benchmark results of future proposed flights. This work included assessments of saltmarsh boundary change. Flights were undertaken at low tide (low water) to illustrate the spatial extent of the low flow channels. Some images were also undertaken at high water to illustrate the extent of inundation of saltmarshes at high tide. The flight
paths are replicated as far as weather conditions allow, taking photographs from similar positions, angle and altitude. Furthermore, flights were only undertaken during good weather conditions with high cloud cover (i.e. not lower than 600 feet).

b. It is proposed to continue these flights for the monitoring programme, using the same flight conditions and flight-paths for the low tide flights. The location and frequency of flights are discussed later in this report.

c. Tide gauge data: This data has been collected using monitoring equipment supplied and installed by OTT Hydrometry for the purposes of the ES, and has been continued since the publication of the ES. This equipment was used to measure tidal elevation, temperature, conductivity and turbidity within the estuary. It is proposed to continue this monitoring throughout the monitoring programme. In addition to the tide gauges installed for the ES, it is proposed that data will be collected from the Environment Agency Tide Gauge at Fiddlers Ferry and also from the Liverpool tide gauge which can be freely downloaded via the British Oceanographic Data Centre (BODC) web site.

d. Saltmarsh edge monitoring: this was undertaken in the ES using both the aerial photographs and topographic survey data to record change from a fixed position. It is proposed to continue this monitoring throughout the Mersey Gateway monitoring programme.

e. Estuary bathymetry: a topographic survey has been undertaken in order to provide a quantitative survey of the study area and provide an indication of the vertical extent of channel change for the ES. The methodology for the topographic surveys is outlined in the Environmental Statement Chapter 7. It is proposed to repeat this survey immediately before construction and then for three years through construction and for a further five years post-completion.

f. Scour: This will be monitored at two locations throughout the monitoring period. The frequency and location of scour monitoring is addressed later in this report.

g. Estuary Volume: Topographic/bathymetric and aerial photography data will be used to calculate a total volume of the upper estuary between the Silver Jubilee Bridge, and Fiddlers Ferry lagoons. This exercise has been undertaken previously and reported in the Environmental Statement (Chapter 7). The methodology for undertaking this calculation will be the same as reported in the ES to ensure comparability of results.

1.2.3 Each of these data monitoring techniques and types are used as standard within the hydrodynamic industry and are commonly used to monitor coastal and estuarine change over long time series or across large spatial areas. They are particularly useful in providing indicators of change within estuarine systems. All of these data will be stored within GIS and will complement the catalogue of existing data.

1.2.4 For each monitoring type, the subsequent interpretation of data will require expertise in marine and/or estuarial environments. Interpretation will be undertaken by a suitably qualified geomorphologist. In particular, interpretation of the aerial photographs requires a geomorphologist with experience in geomorphic system behaviour, estuarine/coastal bar movements and estuarine processes. Knowledge of saltmarsh behaviour may also be required to facilitate interpretation of the behaviour of the estuarine boundaries.

1.2.5 Tide gauge data will be processed and/or interpreted by a suitably qualified scientist or engineer who is familiar with, or has working knowledge of the Mersey Estuary tidal regime. Saltmarsh edge changes will be interpreted by a geomorphologist or a scientist (ecologist). Lastly, bathymetric data will be analysed by a surveyor with a geomorphologist providing a significant input to the interpretation of hydrodynamic/estuarine change.
2. PROPOSED HYDRODYNAMIC MONITORING

2.1 Framework and Stakeholder Involvement

2.1.1 It is proposed that the hydrodynamic monitoring will be undertaken during the construction phase of the Mersey Gateway (this is estimated as 3 years for works in the river) and for up to five years following the year in which construction is completed (however the works last in practice. Following completion of the monitoring period, a detailed review is recommended to determine whether further monitoring is required. Further monitoring will be required only if significant morphological change attributable to the presence of the new bridge is experienced [and that change is more than 25 metres from the foot of the main towers of the new bridge], i.e. change associated with predicted scour adjacent to the towers should not trigger further monitoring.

2.1.2 This document is part of the framework requirements to which HBC, NE, EA and the ACRM are party. Information produced as part of the framework agreement will be supplied to all parties to the Agreement. The information may be supplied on behalf of HBC by the Concessionaire appointed to build and operate the new bridge.

2.2 Draft Monitoring Plan

2.2.1 This Hydrodynamic Monitoring Plan drawn up by Gifford comprises a Monitoring Plan and an Exceptions Plan (Appendix 1). The Monitoring Plan covers a series of estuarine components, monitoring requirements; timescales and frequencies. It comprises a framework of monitoring techniques to be undertaken over the specified monitoring periods. The Exceptions Plan consists of a procedure to define specific steps to mitigate effects which would be implemented should any triggers discussed in the monitoring plan be exceeded. The Monitoring Plan covers a period of up to eight years, including both the in-river construction (estimated at 3 years) and post-construction phases (up to 5 years).

2.2.2 This Monitoring Plan also includes details of the type and frequency of monitoring to be undertaken and the trigger levels that shall be used to initiate the Exceptions Plan. If trigger levels are exceeded, the Exceptions Plan will be initiated. The trigger levels proposed are given in Appendix 1.

Components of the Monitoring Plan

2.2.3 Five components will be monitored namely

- Movement and attachment of channels close to the new bridge
- Movement and change in size of sand bars within the study area;
- Erosion of the boundary of the salt marshes at Astmoor and Widnes Warth;
- Scour at the new bridge piers and Manchester Ship Canal; and
- Change in upper estuary volume.

Location

2.2.4 To provide data for the five components to be assessed, a series of monitoring techniques will be used at specific locations. The exact monitoring locations will be agreed with the statutory and non-statutory bodies following appointment of the concessionaire and completion of this plan.

2.2.5 The current proposed extent of monitoring will be:
• Aerial photography – between the Silver Jubilee Bridge and Fiddlers Ferry Power Station Lagoons, including saltmarsh boundaries (Figure 1);
• Tidal Data. It is proposed to use the existing locations at Old Lock Quay and Wigg Island for comparability with historic data in ES. In addition, data will be collected from the Environment Agency’s tide Gauge at Fiddlers Ferry. The location of these three tide gauges is shown on Figure 2;
• Topographic surveys. These will be undertaken between the Silver Jubilee Bridge and Fiddlers Ferry Power Station Lagoons.
• Scour. Scour monitoring will be undertaken adjacent to the bridge piers/coffer dams and 20m from the Manchester Ship Canal training wall.

Frequency

2.2.6 Currently, it is estimated that the in-river works will take three years to complete, and the monitoring period will continue for a further five years. Should the construction programme change, then the monitoring period would be modified to ensure that at least five full year’s monitoring is completed.

2.2.7 Aerial photographs will be used to assess the movement of channels and sand bars, monitor for channel attachment, erosion of the saltmarsh boundaries, change in size of sand bars and scour at the bridge piers and Manchester Ship Canal wall. It will also be used with topographic data to estimate the size of the upper estuary on an annual basis. Aerial photography will be undertaken on a monthly basis during the construction phase (estimated to be three years in river); every three months for two years following completion of the works and every six months for three years subsequent to this. Analysis of the data will be undertaken after each monitoring episode to assess if the trigger levels are exceeded. Reporting frequency is discussed in section 2.4.

2.2.8 Topographic surveys will be used in conjunction with aerial photographs to monitor the potential for erosion of the saltmarsh edge (Astmoor and Widnes Warth). This will be undertaken annually over the monitoring period.

2.2.9 Tide gauge data will be collected from the four proposed locations and used in conjunction with the aerial photographs and topographic surveys in order to monitor the effect of equinoxial tides and/or storm surges on saltmarshes and also bar movements. The tide data will be used to assess any changes caused to the tidal phasing/amplitude as a result of the construction. Tide gauge data exist as a time series but will be downloaded on a quarterly basis during construction and for two years subsequently (a total of five years) and annually for a further three years.

2.2.10 Scour monitoring will take place in two locations: around the new main towers/coffer dams and along the base of the Manchester Ship Canal Training Wall (20 m from wall face). Collection of scour measurements will be undertaken monthly at both locations during the construction period. The frequency of monitoring would be reviewed at the end of the in-river construction phase (estimated to be 3 years). Any modifications in monitoring should be agreed with Halton Borough Council. However, currently it is thought likely that scour monitoring will continue on a monthly basis for a further five years.
Figure 1. Areas within the Upper Mersey Estuary. Hydrodynamic Study Area comprises S1,2 and 3.

Figure 2. Tide Gauge Locations
2.3 Exceptions Plan

2.3.1 At this stage, the Exceptions Plan comprises a flow chart showing the procedures to be implemented should the trigger levels listed in this report are exceeded. This is shown in Appendix 2.

2.3.2 The Exceptions Plan consists of steps to facilitate remediation if any triggers discussed in the monitoring plan are exceeded within the Monitoring Plan during either the construction or post-construction phase.

2.3.3 The Exceptions Plan consists of three potential actions:

<table>
<thead>
<tr>
<th>Level</th>
<th>Action Type</th>
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<tbody>
<tr>
<td>1</td>
<td>Continuous review and monitoring of change</td>
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<tr>
<td>2</td>
<td>Change and/or increase to the frequency of monitoring</td>
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<tr>
<td>3</td>
<td>Physical intervention</td>
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</table>

2.3.4 The last category, physical intervention, could comprise a number of actions. The exact nature of the intervention will depend on the exact nature of the effect monitored.

2.3.5 In the event of an exception being triggered, third party data will be collected as far (as it is available) to assist in the assessment of the causes of the trigger being exceeded. At present this is predicted to be Environment Agency Data from tide gauges in the outer estuary and meteorological data to identify potential storm surges occurring in the period of the trigger occurring.

2.4 Reporting

2.4.1 Routinely, the monitoring will be reported to the parties to the framework agreement. Factual reports will be prepared on a quarterly basis throughout construction and for two subsequent years, and six monthly for a further three years. An interpretative report will be prepared annually throughout the monitoring period. It is proposed that a stakeholder meeting to receive the interpretative report and discuss the monitoring results is held annually.

Exceptions reporting

2.4.2 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.
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<tr>
<td>Hydrodynamics</td>
<td>1. Movement of channels and sand bars</td>
<td>Aerial photography and topographic surveys</td>
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<td>To confirm continuation of channel movement</td>
<td>Spatial analysis, and observation and comparison using GIS database</td>
<td>Exceptional change. Change of more than 10m beyond normal GIS envelope - using data from the GIS database catalogue</td>
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<td>2. Attachment of channels</td>
<td>Aerial photography</td>
<td>Between upper SPA boundary and Fiddler's Ferry lagoons</td>
<td>Aerial photographs should be undertaken monthly during construction phase; post construction every 3 months for 2 years. Reduce to 6 months for 2 years. At the end of 4 years, major review to determine whether to continue</td>
<td>To confirm channels not attaching to piers</td>
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<td>If channel attaches for more than 3 months</td>
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<td></td>
<td>3. Erosion of boundary of saltmarshes</td>
<td>Aerial photography, topographic survey, tide gauge data</td>
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<td>Provide information on erosion of saltmarshes</td>
<td>Physical measurement of effect via topographic survey. Comparison with aerial photography for spatial extent</td>
<td>Movement of boundaries by greater than 10% of saltmarsh where this is not associated with storm events</td>
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<td>4. Scour at the bridge towers</td>
<td>&quot;Depth - sampling of scour to cofferdam by contractor</td>
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<td>Significant area of scour, persistent for more than three months (i.e reaching 1m above datum (Chart or Ordnance))</td>
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Reporting should be undertaken every 3 months. This should be a report of fact issued to the stakeholder group. An interpretative report should be undertaken on all monitoring data on an annual basis. Where intervention level triggered, report to stakeholder group within 48 hours.
Aerial photographs framework

Action

- monitoring of asymmetry
  - compare to project activities
  - contact EA/HBC to ID other activities in river
  - meeting with EA/NE/AMC to consider significance
  - look for changes in erosion
  - reporting and recommendation
  - review monitoring programme

ID mitigation (if possible)

- site mitigation

Construction methods

ID mitigation (if possible)

- site mitigation

Intervention or further monitoring as agreed

1. Continuous monitoring;
   2. Change and increase in frequency of monitoring;
   3. Physical intervention.

Targets

- If channel attaches to pier for more than 3 months
  - Prepare reports and submit

- Movement of saltmarsh boundaries by greater than 10% of saltmarsh width where this is not associated with storm events

- Significant area of scour, persistent for more than three months
  - ID mitigation (if possible)

Extent - surface area (m²)

True scale

Depth

Meeting with EA/NE/AMC to consider significance

Look for changes in erosion

Reporting and recommendation

Review monitoring programme
### Appendix 3. Mersey Gateway Hydrodynamic Monitoring Plan Programme

#### Construction Years (x3)

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# MERSEY GATEWAY PROJECT
## DRAFT WATER QUALITY MONITORING PLAN

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<td>3</td>
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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 Construction and Operation code of Practice for Environmental management (COPE) has been developed for the Project to define the measures required to mitigate and monitor the construction and operation of the Project 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 ES.

1.1.3 In considering the applications and 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 surface water quality ecology monitoring.

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

1.1.5 This document comprises a draft proposal for the monitoring of surface water quality during both construction and for an appropriate period following completion of the construction of the Project. Its contents will be subject to agreement between Halton Borough Council (HBC), the EA and NE.

1.1.6 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.

1.2 **Proposed Approach**

1.2.1 The surface water quality monitoring plan for the Project incorporates the Monitoring Framework and Exceptions Plan (Appendix A) and Monitoring Programme (Appendix B). The Monitoring Framework sets out the monitoring required in order to assess the water quality within the Estuary and specified freshwater watercourses likely to be affected by the Project before, during and, for a limited period, after construction.

1.2.2 The aim of the Monitoring Framework is to:

   a. Establish a baseline for current water quality in specified freshwater watercourses prior to commencement of the Project.

   b. Ensure that the construction of the Project will not have a material detriment upon the surface water quality of these identified water bodies.

   c. Confirm that mitigation measures put in place during construction are sufficient in preventing any material detriment to surface water quality in the specified watercourse.

   d. Continue to monitor water quality of the Estuary and the specific watercourses for a specified period once the Project is in operation to ensure that attenuation methods are successful.
2. WATER QUALITY MONITORING PLAN

2.1 Framework and Stakeholder Involvement

2.1.1 Baseline pre-construction monitoring is expected to start during 2009 and will continue until construction commences in [2011]. The construction phase is expected to last for [3] years and during this time, there will be a period of intensive monitoring to ensure that the works do not have a materially detrimental impact on surface water quality. Once operation commences, there will be a period of post-construction monitoring which is expected to last for a further [5] years. Therefore, in total there will be [10] years of consecutive monitoring from [2009] onwards.

2.1.2 This document will form part of the mitigation and monitoring requirements for the Project. Information produced as part of the monitoring agreement will be supplied to Halton Borough Council (HBC), Natural England (NE) and the Environment Agency (EA). The information may be supplied on behalf of HBC by the Concessionaire appointed to build and operate the new bridge.

2.2 Water Quality Monitoring Plan

2.2.1 The water quality monitoring plan 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 (i.e. this document) outlines water quality monitoring requirements, methods, timescales and frequencies.

2.2.3 The Exceptions Plan consists of procedures, trigger levels and measures that would need to be implemented in order to mitigate effects. Exceedance of the trigger levels identified would result in the initiation of the Exceptions Plan. The exceedance of these triggers would be identified using the results of the surveys undertaken pre, during and after construction.

2.2.4 A summary of the monitoring programme has been provided in Appendix B to illustrate the timings and frequencies of the sampling periods required by the proposed water quality monitoring plan.

2.3 Components of the Monitoring

2.3.1 Water quality of all potentially affected watercourses will be assessed in terms of:

a. Physico-chemical determinands (dissolved oxygen (DO), pH, salinity, turbidity, ammonia, suspended solids (SS), BOD, total oxidised nitrogen (TON), soluble reactive phosphorus (SRP) and dissolved inorganic nitrogen (DIN));

b. Pollutant/contaminant determinands (e.g. arsenic, mercury, PAHs) as listed in the EA EQS standards and the draft WFD standards (The River Basin Districts Surface Water Typology and Environmental Standards Direction 2008).
Location

2.3.2 Water quality monitoring will take place in all watercourses that could potentially be affected by the Project (Stewards Brook, Bowers Brook, St Helens Canal, Latchford Canal, Bridgewater Canal, Manchester Ship Canal, Halton Brook, Flood Brook and the Mersey Estuary). Watercourses will not be sampled during periods of no flow. Sites will be selected from both upstream and downstream of the works. The exact locations of the sites will be subject to approval by the Local Planning Authority in consultation with the EA.

Purpose of Monitoring

2.3.3 Monitoring will be required in the specified watercourses as they could potentially be at risk from accidental spillages during construction. The purpose of monitoring is set out below.

2.3.4 The water quality of Stewards Brook and Bowers Brook will be monitored for pollution from contaminated sediments entering the watercourses due to the construction of culverts. Monitoring will be directed at chlorinated solvents entering freshwater inflows of Bowers Brook from the Catalyst Trade Park as drainage pipes will be closed off before construction of the Widnes Loops Junction commences.

2.3.5 St Helens Canal will be monitored owing to being temporarily infilled to enable the construction of the Project. Inert material will be used in order to reduce the mobilisation of fine sediments (planning condition 18).

2.3.6 Monitoring will be undertaken within the Mersey Estuary to identify any effects due to scouring action from the construction of cofferdams, towers and the piled jetty and sediments mobilised resulting in contaminant release and increased oxygen demand.

2.3.7 Once operation has commenced, Stewards Brook, St Helens Canal, Flood Brook and the Mersey Estuary are to receive road run off via attenuation systems such as balancing ponds. There will be a requirement to monitor discharge to these watercourses during the first [5] years of the operational phase to ensure mitigation is effective. It may also be necessary to monitor Bowers Brook to ensure that solvent migration has ceased.

Survey Information

2.3.8 Surface water quality will be assessed in terms of a number of physico-chemical determinands to establish a baseline against which to compare construction and operational phase effects. Monitoring data will be compared with the relevant Water Framework Directive Environmental Standards (UKTAG 20081), and the freshwater watercourses will also be compared with the mandatory or guideline values in the EC Freshwater Fish Directive (2006/44/EC), as all freshwater watercourses have the potential to support populations of cyprinid (coarse) fish. The relevant standards for both the freshwater watercourses and the estuary are outlined in Tables A1 and A2 (Appendix A). Contaminant levels will be assessed using Environmental Quality Standards (EA EQS) or the draft WFD guidelines (The River Basin Districts Surface Water Typology and Environmental Standards Direction 2008) if they have been finalised before construction begins. If baseline water quality exceeds these guideline values, trigger levels will be based on an exceedance of the baseline range.

Pre Construction Monitoring

2.3.9 Baseline data will be required for the Estuary and all the freshwater watercourses that may be affected by the Project. Monitoring is proposed to take place for a period of two years before construction commences, and will need to be co-ordinated to take place at the same time as the aquatic ecology monitoring program. This will provide a link between the monitoring data for water quality and aquatic ecology of potentially affected watercourses. Hence, once the construction phase has commenced, any subsequent changes to the water quality, or indeed aquatic ecology, can be determined and appropriate mitigation imposed.

2.3.10 It is proposed to monitor baseline levels of both the estuarine and freshwater watercourses between 2009 and 2011.

Freshwater Watercourses

2.3.11 Pre construction baseline monitoring will be required for all watercourses and will comprise the following surveys:

a. Physico-chemical parameters will be monitored monthly. Water samples will be collected from two sites within each watercourse. They will be analysed for DO, pH, salinity, turbidity, ammonia, suspended solids (SS), BOD, total oxidised nitrogen (TON), soluble reactive phosphorus (SRP) and dissolved inorganic nitrogen (DIN).

b. Water samples will be analysed for a suite of contaminants that could potentially be released from the sediments such as copper, zinc, arsenic, mercury and PAHs. The exact details of the sampling strategy will be approved by the local planning authority in consultation with the EA.

Mersey Estuary

2.3.12 It is considered necessary to monitor the potential impacts of scour on suspended sediment and oxygen demand, and thus on water quality. Surveys within the Mersey Estuary will comprise the following:

a. Physico-chemical parameters will be monitored monthly. Water samples will be collected from six sites within the Mersey Estuary. Six sampling periods will be scheduled during high tide and six sampling periods will be scheduled during low tide annually. They will be analysed for DO, pH, salinity, turbidity ammonia, suspended solids (SS), BOD and dissolved inorganic nitrogen (DIN).

b. Sediment oxygen demand (SOD) is a measurement of the rate at which dissolved oxygen in the overlying water is depleted by the bottom sediment. Sediment oxygen demand (SOD) measurements will be taken at each tower site in situ once every month during peak spring tides using a SOD chamber developed by APEM. This baseline data will help determine the degree of any impacts upon SOD levels observed during and post construction.

c. In conjunction with SOD, further SS and DO measurements will be taken at each tower site monthly. Water samples will be collected three times at each site over a 1.5 hour period during peak spring tides. These data will provide a baseline against which construction monitoring at the same sites can be compared. This comparison will show any increase in SS and associated decrease in DO that may occur as a result of scour around the tower sites/cofferdams.
Monitoring During Construction

2.3.13 It is estimated that in-river works will take [3] years to complete. During this period, monitoring of water quality will take place alongside the aquatic ecology monitoring programme and will follow a similar methodology to that described in paragraphs 2.3.12-13.

**Freshwater watercourses**

a. Water samples will be collected from the same sites as the baseline survey i.e. two sites from Stewards Brook, Bowers Brook, St Helens Canal, Latchford Canal, Bridgewater Canal, Manchester Ship Canal, Halton Brook and Flood Brook. Physico-chemical parameters will be analysed on a monthly basis throughout the construction phase.

b. Water samples will be collected and analysed monthly for a suite of contaminants that could potentially be released from the sediments. The exact details of the sampling strategy will be approved by the local planning authority in consultation with the EA.

**Mersey Estuary**

a. Physico-chemical parameters will be monitored monthly from six sites in the Mersey Estuary.

b. Sediment oxygen demand (SOD) will be monitored in situ on a monthly basis during spring tides at each tower site.

c. Further SS and DO measurements will be taken monthly at each tower site from surface and bottom waters using the same methodology set out in paragraph 2.3.12.

d. During the construction period, there will be additional data loggers situated within the estuary at locations to be approved by the local planning authority in consultation with the EA which will measure turbidity and DO automatically at regular intervals. Any relationship between turbidity and suspended solids will be established.

e. It also is recommended to analyse water samples for a suite of contaminants that are likely to be contained within the sediments on a monthly basis. Exact details will be approved by the local planning authority in consultation with the EA.

2.3.14 Frequent monitoring is necessary to ensure that the construction works are undertaken in an environmental sensitive manner and that the mitigation methods employed are sufficient in preventing any detrimental impacts on surface water quality.

2.3.15 In the event of an accidental spillage or exceedance of the specified trigger levels (Appendix A) extra monitoring will be required whereby the standard suite of physico-chemical and contamination parameters listed above will need to be measured. Extra monitoring should take place within one week of an accidental spillage or exceedance of trigger levels and appropriate mitigation will be imposed.

**Post Construction Monitoring**

2.3.16 There will be a 5 year period of post construction monitoring. Monitoring is to take place monthly for the first 2 years and following review, with the potential to reduce monitoring to quarterly for the remaining 3 years.

2.3.17 Stewards Brook, St Helens Canal, Flood Brook and the Mersey Estuary will be monitored once the new bridge is in operation for a period of five years as they are to receive road runoff via a sustainable drainage system (SuDS). Monitoring will be required to ensure that the mitigation measures (Appendix C) are functional, maintained and fit for purpose.
2.3.18 As it has been proposed to close off the drainage pipes leading from the Catalyst Trading Park to Bowers Brook to prevent solvent migration, monitoring will continue in Bowers Brook for a period of 5 years after operation commences in case of migration of contaminants into the Brook.

2.3.19 Sampling will occur on a monthly basis for five years. Monitoring should follow the same methodology outlined in the baseline monitoring programme.

2.4 Reporting

Pre-Construction Reporting

2.4.1 Baseline water quality data collated in the period leading up to the construction of the Project will be collated with existing baseline information in a pre-construction surface water quality survey report. This information will then inform the mitigation (Appendix C) and provide a baseline against which the effects of construction and success of the mitigation implemented can be measured.

Construction Period Reporting

2.4.2 The results of the water quality survey will be routinely reported to the parties in the Draft Monitoring Plan. Factual reports will be prepared on a quarterly basis, unless the exception plan needed to be implemented, during construction in line with the CEMP requirements. If the exception plan was implemented, immediate contact and/or meetings with the statutory bodies would be required.

Post Construction Reporting

2.4.3 For five years following construction, an annual water quality monitoring report will be prepared. It is proposed that a stakeholder meeting will be held annually to consider the monitoring report and discuss the results.

Exceptions Reporting

2.4.4 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

B1. Mitigation specified in Appendix C should minimise any impacts that the construction or operational phases of the Project may have on water quality. Water quality will be monitored to ensure that the mitigation techniques employed are sufficient. Trigger levels have been identified, and once exceeded, an Exceptions Plan will be implemented so as to bring specific mitigation measures into effect.

B2. The trigger levels will be confirmed once pre-construction monitoring has identified the natural baseline levels of the water quality parameters described in the paragraphs 2.3.12-13 and those previously collected, and relevant environmental standards listed in Tables A1 and A2 plus the EQS or draft WFD standards. The baseline for each determinand is defined as being between the upper and lower 95th percentile confidence limit from the data collection during the pre-construction period.

B3. Environmental standards are based on the relevant Water Framework Directive Standards (UKTAG 20082), and as all the watercourses have the potential to support populations of cyprinid fish, mandatory or guideline values from the EC Freshwater Fish Directive (2006/44/EC) will also be used. The relevant standards for both the freshwater watercourses and the estuary are outlined in Tables A1 and A2 (Appendix A). Contaminant levels will be assessed using Environmental Quality Standards (EA EQS) or the draft WFD guidelines if they are finalised before construction begins.

B4. The Exceptions Plan will be implemented when:

   a. Levels of various determinands (e.g. DO, pH, BOD, ammonia, salinity, TON, SRP, DIN, turbidity and a suite of contaminants) are found to be outside the range of values observed within the baseline dataset; AND
   b. Failure of relevant standards (Table A1 & A2) only when baseline levels are consistently found to comply with these standards i.e. evidence of severe water quality deterioration.

B5. In some cases, it is expected that baseline levels will exceed these triggers as a number of watercourses have been identified as having poor existing water quality (Stewards Brook, Bowers Brook, Latchford Canal and the Manchester Ship Canal (Chapter 8 of the ES, section 8.5). For those watercourses where existing baseline water quality does not meet these standards, it will not be necessary to implement the Exceptions Plan if environmental standards continue to be exceeded during the construction or operational phases. Instead the relevant trigger levels will be based on an exceedance of baseline levels only.

### Table A1. Environmental trigger levels for the freshwater watercourses

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Environmental Standards/Targets</th>
<th>Source of Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO (mg/l)</td>
<td>50% ≥ 7 mg/l</td>
<td>Mandatory level for cyprinid fish (EC Freshwater Fish Directive, (2006/44/EC)</td>
</tr>
<tr>
<td></td>
<td><strong>Minimum concentration:</strong> 4 mg/l</td>
<td></td>
</tr>
<tr>
<td>DO (% saturation)</td>
<td>90% ≥ 80% saturation</td>
<td>WFD 'Good' status standard for lowland high alkalinity rivers (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>BOD (mg/l)</td>
<td>90% ≤ 5 mg/l</td>
<td>WFD 'Good' status standard for lowland high alkalinity rivers (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>Total Ammonia (mg/l)</td>
<td>90% ≤ 0.6 mg/l</td>
<td>WFD 'Good' status standard for lowland high alkalinity rivers (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>pH</td>
<td>90% 6 to 9</td>
<td>WFD 'Good' status standard all rivers in England &amp; Wales (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>SRP (μg/l)</td>
<td>Annual mean should not exceed 120 μg/l</td>
<td>WFD 'Good' status standard for Type 3n (lowland high alkalinity) rivers (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>Suspended Solids (mg/l)</td>
<td>≤ 25 mg/l</td>
<td>Guideline level for cyprinid fish (FFD, 2004)</td>
</tr>
<tr>
<td>Total Zinc (mg/l)</td>
<td>≤ 1.0 mg/l</td>
<td>Mandatory level for cyprinid fish (EC Freshwater Fish Directive, (2006/44/EC)</td>
</tr>
<tr>
<td>Dissolved Copper (mg/l)</td>
<td>≤ 0.04 mg/l</td>
<td>Guideline level for cyprinid fish (EC Freshwater Fish Directive, (2006/44/EC)</td>
</tr>
</tbody>
</table>

### Table A2. Environmental trigger levels for the Mersey Estuary

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Environmental Standards/Targets</th>
<th>Source of Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO (mg/l)</td>
<td>95% ≥ 4 – 5.7 mg/l (depending on salinity)</td>
<td>WFD ‘Good’ status standard for transitional and coastal waters (UKTAG phase 1, 2008)</td>
</tr>
<tr>
<td>DIN (μg/l)</td>
<td>Winter mean should not exceed 30 μg/l</td>
<td>Draft WFD Good’ status standard for transitional waters (salinity ≤ 30 ppt) (UKTAG phase 2, 2008)</td>
</tr>
</tbody>
</table>

---

**Exceptions Plan**

B6. If the exceptions plan is triggered using the above criteria, emergency procedures will follow and activities will be reviewed to order to identify the source of the contamination and implement appropriate mitigation (Appendix C). This procedure should take approximately 10 days.

B7. If trigger levels are exceeded, the following exceptions plan should be implemented:

1. **Trigger levels exceeded**
2. **Implement emergency procedure**
3. **Review activities and identify source of contamination**
4. **Implement appropriate mitigation**
### APPENDIX B: MONITORING PROGRAMME

Table C1: The information below provides an outline of the sampling frequency required by the proposed water quality monitoring plan.

<table>
<thead>
<tr>
<th>Monitoring Period</th>
<th>Receptor</th>
<th>Parameters measured</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre construction</td>
<td>Freshwater watercourses</td>
<td>Physico-chemical parameters: DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>Mersey Estuary</td>
<td>Physico-chemical parameters: DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Monthly (6 times during high tide, 6 times during low tide annually)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sediment oxygen demand</td>
<td>Monthly during peak spring tide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SS and DO at tower sites</td>
<td>Monthly during peak spring tide</td>
</tr>
<tr>
<td>Construction monitoring</td>
<td>Freshwater watercourses</td>
<td>Physico-chemical parameters: DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>Mersey Estuary</td>
<td>Physico-chemical parameters: DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Monthly (6 times during high tide, 6 times during low tide annually)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Monthly (6 times during high tide, 6 times during low tide annually)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sediment oxygen demand</td>
<td>Monthly during peak spring tide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SS and DO at tower sites</td>
<td>Monthly during peak spring tide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physico-chemical parameters e.g. DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
<tr>
<td>Post construction</td>
<td>Freshwater watercourses</td>
<td>Physico-chemical parameters e.g. DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
<tr>
<td></td>
<td>Mersey Estuary</td>
<td>Physico-chemical parameters e.g. DO, SS, ammonia, pH, turbidity, BOD, TON, SRP, DIN</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contaminants e.g. copper, lead, zinc</td>
<td>Initially monthly for 2 years, then potentially quarterly for three years</td>
</tr>
</tbody>
</table>
## APPENDIX C: MITIGATION MEASURES RELATED TO SURFACE WATER QUALITY

<table>
<thead>
<tr>
<th>Construction Impacts</th>
<th>Impact ID</th>
<th>Effect</th>
<th>Mitigation &amp; Enhancement Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SWQ1</td>
<td>Water quality in Stewards Brook</td>
<td>Management techniques should be used to mitigate effect on water quality within the brook. A water management plan and pollution control contingency plan should be prepared, particularly for works within watercourses. It will be necessary to ensure that materials within or adjacent to the brook do not enter the brook during construction so as to minimise any pollution incidents from sediments or contaminated materials. It will be necessary to over pump the brook to ensure that the working area is dry which will minimise pollution incidents.</td>
</tr>
<tr>
<td></td>
<td>SWQ2</td>
<td>Water quality in Bowers Brook</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ3</td>
<td>Water quality in Stewards Brook</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ4</td>
<td>Water quality in Bowers Brook</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ5</td>
<td>Water quality in St Helens Canal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ6</td>
<td>Water quality in the estuary</td>
<td>Physical techniques will be employed to minimise the risk of accidental spillages during the construction phase. Environmental best practice should be used including the use of bunded fuel tanks, keeping stockpiles of contaminated materials and fuel tanks away from watercourses, use of spill mats and drip trays and other methods as suggested in the ES Chapter.</td>
</tr>
<tr>
<td></td>
<td>SWQ7</td>
<td>Water quality in the Latchford Canal</td>
<td></td>
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<tr>
<td></td>
<td>SWQ8</td>
<td>Water quality in the Manchester Ship Canal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ9</td>
<td>Water quality in the Bridgewater Canal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ10</td>
<td>Water quality in Flood Brook</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SWQ11</td>
<td>Water quality in Bowers Brook</td>
<td>Source reduction techniques should be employed to minimise the migration of chlorinated solvents toward Bowers Brook. Other techniques could be used such as the construction of a cut off wall to act as a physical barrier.</td>
</tr>
<tr>
<td></td>
<td>SWQ12</td>
<td>Water quality in St Helens Canal</td>
<td>Stone should be chemically inert (such as granite or shale) and pre-washed in a controlled location to minimise the release of fines into the St Helens Canal.</td>
</tr>
<tr>
<td></td>
<td>SWQ13</td>
<td>Water quality in the river.</td>
<td>Management techniques should be used to mitigate effect on water quality within the brook. A water management plan and pollution control contingency plan should be prepared, particularly for works within the river. Physical techniques could include the use of silt nets to be used for piling operations.</td>
</tr>
<tr>
<td>Construction Impacts</td>
<td>Impact ID</td>
<td>Effect</td>
<td>Mitigation &amp; Enhancement Measure</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
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<td>----------------------------------</td>
</tr>
<tr>
<td>(SOD)</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Following removal of the access track along the salt marsh by the action of ripping, loose material may be brought to the surface. Increased sediment load in the estuary may result from tidal inundation of the area, washing loose material into the estuary.</td>
<td>SWQ 16</td>
<td>Water Quality in the estuary.</td>
<td>Ripping action should be avoided during the highest annual spring tides that inundate the salt marsh. Sufficient time should be allowed for re-establishment of vegetation before the area is tidally inundated.</td>
</tr>
<tr>
<td>Operational Impacts</td>
<td>Impact ID</td>
<td>Effect</td>
<td>Mitigation &amp; Enhancement Measure</td>
</tr>
<tr>
<td></td>
<td>SWQ14</td>
<td>Water quality in St Helens Canal</td>
<td>Physical measures will be incorporated through control measures will be incorporated into the drainage design such as interceptors, oil traps, gulley pots and scum boards to remove contaminants from runoff. These will then pass into a balancing pond or a swale which will remove sediments before discharging into the receiving watercourse.</td>
</tr>
</tbody>
</table>
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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 Mersey Gateway Project (the “Project”), a series of applications has 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 Construction and Operation code of Practice for Environmental management (COPE) has been developed for the Project to define the measures required to mitigate and monitor the construction and operation of the Project 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 ES.

1.1.3 In considering the applications and ES, Natural England (NE) and the Environment Agency (EA) have commented on the proposals for ecological monitoring in the Upper Mersey Estuary Local Wildlife Site (LWS). This has resulted in the agreement to secure the ecological monitoring of this environment.

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

1.1.5 The Upper Mersey Estuarine Ecology Monitoring Plan is expected to be delivered by the Concessionaire, who will construct the Project, on behalf of Halton Borough Council (HBC). This document comprises a draft proposal for the monitoring of the ecology of the Upper Mersey Estuary both during construction and for an appropriate period following completion of the construction. Its content will be the subject of agreements between HBC, NE and the EA.

1.1.6 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) and the Biodiversity Management Plan (BDMP) for the Project.

1.2 Proposed Approach

1.2.1 This estuarine ecology monitoring plan, drawn up by Gifford, ERAP and HBC, comprises a Monitoring Report (this document), a Monitoring Framework (Appendix A) and an Exceptions Plan (Appendix B).

1.2.2 The Monitoring Framework (Appendix A) has been sub-divided into monitoring required before, during and after construction. Ecological monitoring within the estuary focuses on two key ecological features including: birds and saltmarsh habitats.

1.2.3 The aim of the framework is as follows:

a. Establish current ecological baseline building upon the results of the ES;
b. Ensure birds and saltmarsh habitats within the Upper Mersey Estuary are protected as far as possible during construction and that all works are undertaken in a sensitive manner;
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

e. Inform long term management plans to conserve the estuarine habitats.
2. PROPOSED UPPER MERSEY ESTUARINE ECOLOGY MONITORING

2.1 Framework and Stakeholder Involvement

2.1.1 It is proposed that ecological monitoring be undertaken prior to, during and after construction of the Project. It is estimated that construction works within the River Mersey itself will commence in 2012 (construction start date) and be ongoing for [3] years. It is estimated that the ecological mitigation package to be provided within the Upper Mersey Estuary (as set out in the COPE and BDMP) will take up to [6] years to develop and establish and to begin to deliver the forecast ecological benefits following completion of construction. The total timeframe of the estuarine ecology monitoring plan will therefore be [6] years following completion of construction, giving a total survey period of [13] years (i.e. from 2009 onwards).

2.1.2 This document is part of the monitoring plan requirements to which HBC, NE and the EA are party. Information produced as part of the monitoring agreement will be supplied to all parties to the Agreement. The information may be supplied on behalf of HBC by the Concessionaire appointed to build and operate the Project.

2.2 Draft Upper Mersey Estuarine Ecology Monitoring Plan

2.2.1 This monitoring plan covers a period of [13] years, including both the pre construction surveys (estimated at [4] years), in-river construction works (estimated at [3] years) and post-construction phases (up to [6] years).

2.2.2 The Monitoring Framework (Appendix A) covers a series of ecological 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 shall be used to initiate the Exceptions Plan (Appendix B).

2.2.3 The Exceptions Plan shall consist of a procedure, trigger levels and mitigation measures to mitigate effects and to reflect the requirements of the Monitoring Framework. Exceedence of the triggers identified would result in the initiation of an Exceptions Plan. An outline Exceptions Plan is included at Appendix B of this document, the details of this plan shall be informed by the Monitoring Framework and worked up by the Concessionaire. The exceedance of these triggers would be identified using the results of survey undertaken pre, during and after construction.
2.3 Components of the Monitoring Plan

2.3.1 The two key ecological receptors (or components) within the Upper Mersey estuarine environment that will be monitored are:

a. Birds; and
b. Saltmarsh Habitat (including intertidal zones).

Location

2.3.2 To provide data for the two components to be assessed, a series of monitoring techniques will be used at locations within the mitigation boundary (i.e. [200] metres from the line of the new bridge forming part of the Project). The exact monitoring locations will be proposed in consultation with NE and the HBC Conservation Office following appointment of the Concessionaire and prior to submission of this plan for approval by HBC.

Survey Information

Pre Construction Monitoring

2.3.3 Prior to construction bird and habitat surveys shall be undertaken within the Upper Mersey Estuary to ensure a current baseline is established against which the effects of the Project and the success of the estuarine mitigation package can be measured. The baseline ecological features of the estuarine environment are proposed to be monitored between 2009 and 2012.

2.3.4 Pre construction baseline monitoring surveys shall comprise the following surveys:

a. Bird Surveys: Monthly bird breeding, wintering and resident bird surveys undertaken in line with the Common Bird Census (CBC) methodologies. This shall involve monthly walked transects along the line of the new bridge corridor recording bird presence and bird activity on the saltmarshes and within the intertidal zones;

b. Saltmarsh Habitat: One pre-construction National Vegetation Classification (NVC) survey shall be undertaken within the limits of land to be acquired or used during flowering season (mid to late summer). This will enable all NVC communities to be identified both in the field and by analysis of the recorded DAFOR\(^1\) and percentage cover observations for each species. Other important NVC community identification factors, in addition to species composition, shall also be monitored. These include factors such as drainage, habitat conditions, soil type, management techniques and geographical information.

2.3.5 In addition, should vegetation in the construction corridor need to be removed within the bird breeding season\(^2\) it shall be checked for evidence of breeding birds. This shall ensure compliance with Part 1 of the Wildlife and Countryside Act (1981) which makes it an offence to intentionally kill, injure or take any species of wild bird, and to take, damage or destroy their nests or eggs. Should breeding birds be identified vegetation clearance will need to be stopped until any nestlings have left the nest. This survey shall be undertaken in advance of clearance on a “site by site” basis by a suitably qualified ornithologist.

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\(^1\) Dominant, Abundant, Frequent, Occasional or Rare

\(^2\) The bird breeding season runs from March to September inclusive.
2.3.6 Prior to adoption of the estuarine ecological mitigation package and implementation of any grazing regime the suitability of saltmarsh habitat for use for grazing stock shall be verified. This shall be undertaken through a grass and forage survey which shall be designed to ensure that the habitat is suitable for the proposed grazing stock. The output of this survey shall inform the grazing specification implemented as part of the Upper Mersey Estuary mitigation package.

**Monitoring During Construction**

2.3.7 Currently, it is estimated that the in-river works shall take [3] year to complete. During this period, ecological surveillance (completed by an ecological walkover) shall be undertaken on a weekly basis as part of the CEMP review procedure. This shall involve a visual inspection of all habitats within the construction corridor to ensure that the works are being undertaken in a sensitive manner and that the saltmarsh habitat is not adversely affected. Visual inspections shall identify evidence of physical changes such as compaction, rutting and depressions. A method statement will be agreed with the HBC Conservation Office prior to construction detailing sensitive methods of working and implemented through the CEMP.

**Post Construction Monitoring**

2.3.8 To monitor the success of ecological mitigation and to inform the long term management of the Upper Mersey Estuary environment a [6] year post construction monitoring regime shall be adopted focusing on the two key estuarine ecological receptors; birds and saltmarsh habitat.

2.3.9 Monthly bird surveys shall be undertaken in line with the CBC methods (described at Section 2.3.4 (a)) for three years following completion of construction within the Estuary. These surveys shall be undertaken in tandem with annual Wetland Bird Surveys (WeBS) and high tides to ensure accurate and comparable survey results. This survey data shall be collected within the limits of land to be acquired or used.

2.3.10 To monitor the success of ecological mitigation implemented in the Upper Mersey Estuary that annual NVC surveys shall be undertaken over a [6] year period following construction of the new bridge. These shall be undertaken in line with the methods described at Section 2.3.4 (b) and within the limits of land to be acquired or used. To compliment the results of the annual NVC surveys pool, creek and scrape systems shall be identified within this study area and cross sections produced to demonstrate the continued development of scrapes in line with specifications set out in the BDMP.

2.3.11 In line with the Aquatic Ecology Monitoring Plan (B4027D/COPE/APPENDIXB4) annual invertebrate sampling shall be undertaken in the water features within the limits of land to be acquired or used. As part of the Hydrodynamic Monitoring Plan (B4027D/COPE/APPENDIXB1) geomorphological processes within the estuary shall also be monitored. Monitoring information obtained on aquatic and morphology changes within the estuary shall be considered upon review of the ecological monitoring results.

2.4 **Exceptions Plan**

2.4.1 At this stage, the Exceptions Plan comprises a flow chart showing the procedures to be implemented should the trigger levels listed in this report are exceeded. This is shown in Appendix B. The details of this plan are to be developed by the Concessionaire in line with the requirements of the Monitoring Framework.
2.4.2 The Exceptions Plan shall consist of a series of steps to facilitate remediation should any triggers discussed in the Monitoring Framework be exceeded within the Upper Mersey Estuary during either the construction or post-construction phase.

2.4.3 The Exceptions Plan shall consist of three potential actions:

<table>
<thead>
<tr>
<th>Level</th>
<th>Action Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous review and monitoring of change</td>
</tr>
<tr>
<td>2</td>
<td>Change and/or increase to the frequency of monitoring</td>
</tr>
<tr>
<td>3</td>
<td>Intervention</td>
</tr>
</tbody>
</table>

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

2.4.5 The proposal for a charitable trust to deliver the wider ecological strategy for the Upper Mersey Estuary now has the approval of the Mersey Gateway Executive Board. The detailed working of the Trust shall then be set up, and it is envisaged that the monitoring plan for the Project shall be part of this wider delivery mechanism.

2.5 Reporting

Pre-Construction Reporting

2.5.1 Baseline ecological data collated in the period leading up to the construction of the Project shall be collated with existing baseline information in a pre-construction ecology survey report. This information shall then 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 shall be reported to the parties to the monitoring agreement. Factual reports shall be prepared on a weekly basis during construction in line with the CEMP requirements.

Post Construction Reporting

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

Exceptions Reporting

2.5.4 Where any exception occurs, this shall be reported as soon as reasonably practicable. At this point, the actions proposed shall also be notified to parties affected.
## APPENDIX A: MONITORING FRAMEWORK

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre Construction</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Birds:</td>
<td>Breeding Bird</td>
<td>Breeding, wintering</td>
<td>All areas within the limits of land to be acquired or used</td>
<td>Monthly between March 2009 and start of construction (2008 to 2012)</td>
<td>Update existing baseline information to inform mitigation design and provide monitoring baseline</td>
<td>Ornithological Surveys</td>
<td>n/a</td>
<td>Pre-construction ecology survey report in line with CEMP requirements.</td>
<td></td>
</tr>
<tr>
<td>2. Saltmarsh Habitat &amp; Intertidal Zones:</td>
<td>Vegetation</td>
<td>NVC surveys to be undertaken during appropriate season (mid to late summer),</td>
<td>All areas subject to grazing / management as part of the mitigation strategy and within the limits of land to be acquired or used</td>
<td>One survey prior to start of construction</td>
<td>Ensure botanical database is up to date and to inform ecological management components of Upper Mersey Estuary mitigation strategy and provide monitoring baseline</td>
<td>NVC Survey</td>
<td>n/a</td>
<td>Pre-construction ecology survey report and to inform the mitigation elements of the BDMP.</td>
<td></td>
</tr>
<tr>
<td>2. Saltmarsh Habitat &amp; Intertidal Zones:</td>
<td>Grazing Suitability</td>
<td>Grass and forage survey</td>
<td>Upper Mersey Estuary mitigation area proposed for grazing</td>
<td>Single survey prior to implementation of grazing regime</td>
<td>Prior to the introduction of the cattle grazing project to ensure the habitat is suitable for specified stock.</td>
<td>Grass and forage survey</td>
<td>n/a</td>
<td>Inform the mitigation elements of the BDMP.</td>
<td></td>
</tr>
<tr>
<td>2. Saltmarsh Habitat &amp; Intertidal Zones:</td>
<td>Grazing Suitability</td>
<td>Sampling of vegetation and subsequent analysis by appropriate UCAS lab.</td>
<td>Upper Mersey Estuary mitigation area proposed for grazing</td>
<td>Single survey prior to implementation of grazing regime</td>
<td>To establish whether plant uptake of potentially hazardous materials may have an effect on grazing stock and its end use</td>
<td>Chemical analysis</td>
<td>n/a</td>
<td>Regime and cattle type will be modified depending on outcome of analysis</td>
<td>Inform graziers and inform the mitigation elements of the BDMP.</td>
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</tr>
<tr>
<td>1. Birds: Breeding / Nesting Birds (only where vegetation is to be removed inside the bird breeding season i.e. March to September inclusive)</td>
<td>Visual inspections by competent ornithologist of all suitable bird breeding habitat to be removed</td>
<td>All areas within the limits of land to be acquired or used</td>
<td>1 week prior to removal of vegetation. To be undertaken in stages in line with construction programme</td>
<td>Ensure compliance with Wildlife and Countryside Act (1981)</td>
<td>Ornithological Survey</td>
<td>Presence of nesting birds within vegetation for removal</td>
<td>Works not permitted in areas where nesting birds are identified as being present. Works delayed until birds have fledged their nest.</td>
<td>Breeding bird survey report to be completed as part of the pre-construction enabling works process implemented under CEMP requirements</td>
<td></td>
</tr>
</tbody>
</table>

**During Construction**

| 1. Birds: Breeding Bird | Breeding, wintering and resident bird surveys. In line with CBC methods. Specific birds to be surveyed include: shelduck, teal, golden plover, lapwing, curlew, dunlin, redshank, skylark and meadow pipit. | All areas within the limits of land to be acquired or used | Monthly during construction period | Maintain baseline information to inform mitigation design and provide monitoring baseline. | Ornithological Surveys | n/a | n/a | Reporting on a weekly basis in line with CEMP inspection requirements |

2. Saltmarsh Habitat

Ecological Surveillance. Weekly visual inspections required within works areas in line with CEMP requirements

<p>| All areas within the limits of land to be acquired or used | Weekly in line with CEMP reporting requirements | To ensure saltmarsh habitat is not adversely effected by works. Identify adverse effects e.g. evidence of physical changes | Ecological Surveillance | Evidence of physical changes to saltmarsh habitat e.g. rutting, depressions, compaction | In line with methods set out within the method statement to be agreed with HBC Conservation Officer and implemented under the CEMP. Sensitive timing of the works, avoidance of sensitive areas (through the use of fencing), implementation of machinery / personnel restrictions. | Reporting on a weekly basis in line with CEMP inspection requirements |
|-------------------|---------------------|------|-----------------|----------------|------|------|---------------------------------------|-------------------|----------|
| Post Construction |                     |      |                 |                |      |      |                                       |                   |          |
| Ecology: Upper Mersey Estuarine Environment |                     |      |                 |                |      |      |                                       |                   |          |
| 1. Birds: Wading and Wildfowl Birds | Bird surveys in line with WeBS and CBC survey techniques. Specific birds to be surveyed include: shelduck, teal, golden plover, lapwing, curlew, dunlin, redshank, skylark and meadow pipit. | Bird surveys | All areas within the limits of land to be acquired or used | Monthly (timings to coincide with high tides and national WeBS survey dates). Monthly surveys ongoing for 3 year after bridge completion. | To monitor the efficacy of the BDMP and Upper Mersey Estuary essential mitigation package. To inform the 20 year management plan process. | Bird surveys | Bird numbers using the area of saltmarsh within the management area are at similar levels to those using the saltmarsh areas as established during the preparation of the ES and the baseline surveys | Use of artificial measures to enhance saltmarsh habitats (water features and vegetation communities). Such measures may include altering cattle grazing regimes and reviewing pool, creek and scrape locations / cross sections. | Post construction monitoring reporting as part of the ongoing BDMP requirements. |</p>
<table>
<thead>
<tr>
<th>2. Saltmarsh Habitat &amp; Intertidal Zones: Vegetation</th>
<th>NVC surveys to be undertaken during flowering season (mid to late summer). Survey to include cross sections of pool, creek and scrape systems</th>
<th>NVC Survey</th>
<th>All areas within the limits of land to be acquired or used</th>
<th>One survey to be completed within 12 months of bridge completion. Ongoing surveys 1 survey every 2 years for 6 years. Review of survey requirements at the 6 year mark.</th>
<th>To monitor the efficacy of the BDMP and Upper Mersey Estuary essential mitigation package. To inform the 20 year management plan process. The reporting mechanism shall be provided by the Charitable Trust during this period.</th>
<th>NVC Survey</th>
<th>NVC target saltmarsh communities not achieved</th>
<th>Change in grazing regimes, organic enrichment and use of fencing and cutting/mowing.</th>
<th>Post construction monitoring reporting as part of the ongoing BDMP requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Saltmarsh Habitat &amp; Intertidal Zones: Water Features</td>
<td>Pool, creek and scrape system cross sections to be prepared as part of NVC surveys</td>
<td>All areas within the limits of land to be acquired or used</td>
<td>One within 12 months of bridge completion. Ongoing surveys at 1 survey every 2 years for 6 years. Review of survey requirements at the 6 year mark.</td>
<td>To monitor the efficacy of the BDMP and Upper Mersey Estuary essential mitigation package. To inform the 20 year management plan process.</td>
<td>Water feature survey</td>
<td>Pools/scrapes and creeks specified as part of the Upper Mersey Estuary mitigation package not formed. Or infilled as a result of tidal processes.</td>
<td>Minor mechanical operations</td>
<td>Post construction monitoring reporting as part of the ongoing BDMP requirements.</td>
<td></td>
</tr>
<tr>
<td>2. Saltmarsh Habitat &amp; Intertidal Zones: Aquatic Invertebrates</td>
<td>Pool, creek and scrape systems to be surveyed for aquatic invertebrate diversity and abundance. Use of netting and scrape techniques. Refer to Aquatic Ecology Monitoring Plan.</td>
<td>All areas within the limits of land to be acquired or used</td>
<td>In line with Aquatic Ecology Monitoring Plan (B4027D/COPE/APPENDIXB4)</td>
<td>To monitor the efficacy of the BDMP and Upper Mersey Estuary essential mitigation package. To inform the 20 year management plan process.</td>
<td>Aquatic invertebrate surveys</td>
<td>Aquatic invertebrate diversity and abundance below levels identified pre construction (baseline surveys).</td>
<td>Minor mechanical operations to improve water feature habitats.</td>
<td>Post construction monitoring reporting as part of the ongoing BDMP requirements.</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B: EXCEPTIONS PLAN

Exceedence of Intervention / Trigger Levels as set out in Monitoring Framework (Appendix A)

Determine action required based on Monitoring Framework action protocols

Undertake consultation with Statutory Authorities

Review and adapt mitigation techniques to ensure trigger levels are not exceeded in the future
MERSEY GATEWAY PROJECT

DRAFT AQUATIC ECOLOGY MONITORING PLAN
MERSEY GATEWAY PROJECT
DRAFT AQUATIC ECOLOGY MONITORING PLAN

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Appendix A: Aquatic Ecology Exceptions Plan
Appendix B: Aquatic Ecology Monitoring Programme
Appendix C: Aquatic Ecology Exceptions Plan
Appendix D: Map of Study Area
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 Construction and Operation code of Practice for Environmental management (COPE) has been developed for the Project to define the measures required to mitigate and monitor the construction and operation of the Project 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 ES.

1.1.3 In considering the applications and 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.

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

1.1.5 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. Its contents will be subject to agreements between Halton Borough Council (HBC), the EA and NE.

1.1.6 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.

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, and also where required within the River Mersey upstream of the Project.

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 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.
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. 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 (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.

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

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. 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.

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 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:

<table>
<thead>
<tr>
<th>Level</th>
<th>Action Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous review and monitoring of change</td>
</tr>
<tr>
<td>2</td>
<td>Change and/or increase to the frequency of monitoring</td>
</tr>
<tr>
<td>3</td>
<td>Intervention</td>
</tr>
</tbody>
</table>

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 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.

<table>
<thead>
<tr>
<th>Watercourse</th>
<th>Determinand</th>
<th>Trigger level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mersey Estuary</td>
<td>Benthic algae, phytoplankton, benthic invertebrates, fish.</td>
<td>A change in abundance or community composition (above and beyond that observed for the pre-construction baseline data). Environmental conditions unrelated to the Project would be considered when assessing the trigger level following establishment of the baseline.</td>
</tr>
<tr>
<td>2. River Mersey</td>
<td>Salmon.</td>
<td>A decline in numbers caught in the fish trap at Woolston Weir following establishment of the baseline during construction of the Project.</td>
</tr>
<tr>
<td>3. Freshwater watercourses</td>
<td>Macrophytes, invertebrates.</td>
<td>A change in abundance or community composition (above and beyond that observed for the pre-construction baseline data). Environmental conditions unrelated to the Project would be considered when assessing the trigger level following establishment of the baseline.</td>
</tr>
<tr>
<td>4. Mersey Estuary</td>
<td>Safety zone for marine mammals</td>
<td>Observation of a marine mammal within the safety zone during construction.</td>
</tr>
</tbody>
</table>
Exceptions Plan

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

- **Trigger levels exceeded e.g. outside of baseline range**
  - If trigger level is exceedence of a value:
    - Cease construction until levels reduce naturally
    - Review and adapt mitigation techniques to ensure trigger levels are not exceeded in the future
  - If trigger level is a change in abundance or community structure:
    - Conduct targeted monitoring on aquatic component for which change is observed.
    - Assess change, recommend appropriate mitigation/compensation as required
**APPENDIX B: MONITORING PROGRAMME**

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

<table>
<thead>
<tr>
<th>Monitoring Period</th>
<th>Receptor</th>
<th>Parameters measured</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-construction</td>
<td>Infauna and benthic algae</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Phytoplankton</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Epifauna and fish</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Marine mammals</td>
<td>Abundance and community composition (assessment of available information and consultation with appropriate organisations)</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Canal and brook flora and fauna</td>
<td>Abundance and community composition (macrophytes and invertebrates)</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Migratory fish</td>
<td>Abundance</td>
<td>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)</td>
</tr>
<tr>
<td>Construction</td>
<td>Infauna and benthic algae</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Phytoplankton</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Epifauna and fish</td>
<td>Abundance and community composition. Measurement of underwater noise using hydrophones.</td>
<td>Spring and summer each year Noise measurement during pile driving activity</td>
</tr>
<tr>
<td></td>
<td>Marine mammals</td>
<td>Spotters to observe mammals within safety zone during construction. Measurement of underwater noise using hydrophones.</td>
<td>During pile driving activity</td>
</tr>
<tr>
<td></td>
<td>Canal and brook flora and fauna</td>
<td>Abundance and community composition (macrophytes and invertebrates)</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Migratory fish</td>
<td>Abundance</td>
<td>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)</td>
</tr>
<tr>
<td>Monitoring Period</td>
<td>Receptor</td>
<td>Parameters measured</td>
<td>Frequency</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Post construction monitoring</td>
<td>Infauna and benthic algae</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Phytoplankton</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Epifauna and fish</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Canal and brook flora and fauna</td>
<td>Abundance and community composition</td>
<td>Spring and summer each year</td>
</tr>
<tr>
<td></td>
<td>Migratory fish</td>
<td>Abundance</td>
<td>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).</td>
</tr>
</tbody>
</table>
## APPENDIX C: MITIGATION MEASURES

<table>
<thead>
<tr>
<th>Effect</th>
<th>Mitigation &amp; Enhancement Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>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.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>Establishment of a safety zone to protect marine mammals.</td>
</tr>
<tr>
<td>Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to intertidal and subtidal habitat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to infauna and benthic algae.</td>
<td>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).</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>Removal and redispersal of sediments which are usually static. Increased density of sediment particles in water column to epifauna and fish.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect</td>
<td>Mitigation &amp; Enhancement Measure</td>
<td>Source</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>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.</td>
<td>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.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>No mitigation possible.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>No mitigation possible.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>Ensure adequate space between pilings for fish to pass through.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>Infilling of section of the St Helens Canal. Fish likely to be impacted. Displacement of organisms and reduction of available habitats for aquatic flora and fauna.</td>
<td>No mitigation possible.</td>
<td>Chapter 11, ES</td>
</tr>
</tbody>
</table>

**Operational Phase**
<table>
<thead>
<tr>
<th>Effect</th>
<th>Mitigation &amp; Enhancement Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispersal of contaminants due to resuspension of deeper sediments. Pollution of intertidal sediments due to road runoff/spillages to intertidal and subtidal habitat.</td>
<td>Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Interceptors on bridge and to prevent road spillages/runoff.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Interceptors on bridge and to prevent road spillages/runoff.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>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.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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 areas. Bioaccumulation of contaminants along food chain.</td>
<td>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.</td>
<td>Chapter 11, ES</td>
</tr>
<tr>
<td>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.</td>
<td>No mitigation possible.</td>
<td>Chapter 11, ES</td>
</tr>
</tbody>
</table>
MERSEY GATEWAY PROJECT

BIODIVERSITY MANAGEMENT PLAN

Halton Borough Council
Rutland House
Halton Lea
Runcorn
Cheshire
WA7 2GW
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APPENDIX DESCRIPTION

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APPENDIX 2 Specification of the desired saltmarsh plant communities.
APPENDIX 3 Mitigation Scheme for the Ecological Effects of the Project on Terrestrial Ecology Receptors
1. INTRODUCTION

1.1 The Mersey Gateway Project

1.1.1 Halton Borough Council (the “Council”) is promoting a new road crossing of the Mersey Estuary (the “Estuary”) in the Borough of Halton (the “Borough”) and associated works to incorporate the new road crossing into the existing road network and to make changes to that network. Collectively the works required are known as the Mersey Gateway Project (hereafter referred to as the “Project”).

1.1.2 The Project will provide effective road connections to the Liverpool City area from north Cheshire in the south, thereby providing effective connectivity for the sub-region and addressing existing congestion in the Borough. The new road capacity provides an opportunity to re-balance the transportation infrastructure within Halton towards delivering local sustainable transport and economic goals.

1.1.3 The Project’s scope includes the following:

   a. The delivery of a new road crossing of the River in Halton, known as the Mersey Gateway Bridge (referred to as the “New Bridge” throughout this plan);
   b. Incorporation of the New Bridge in the existing highway network. These works are referred to as the Remote Highway Works;
   c. Modification and de-linking of the Silver Jubilee Bridge (SJB);
   d. Integration of the revised networks with public transport, cycle and pedestrian links across Halton;
   e. Integration with the surrounding environment through landscaping adjacent to the New Bridge and SJB; and
   f. Implementation of tolling and development of associated infrastructure.

1.2 Construction and Operation Code of Practice

1.2.1 A Construction and Operation code of Practice for Environmental management (COPE, B4027D/COPE/R01) has been prepared for the Project. It defines the measures required to mitigate and monitor the construction and operation of the Project so as to protect the environment. It elaborates upon the mitigation proposals set out in the Environmental Statement (ES) and also those that the Council proposes following discussions with stakeholders. It covers specific regulatory and best practice requirements.

1.2.2 The COPE sets out the requirements for a series of more detailed environmental management plans to ensure that the objectives of the COPE are satisfied, environmental legislative requirements are met and the environment is protected.
1.3 Purpose of this Document

1.3.1 This document is the Biodiversity Management Plan (BDMP) and forms one of the more detailed environmental management plans required by the COPE. It sets out ecological mitigation and monitoring measures required to mitigate the effects of the Project as drawn from the ES (Chapters 10 (Terrestrial & Avian Ecology) and 11 (Aquatic Ecology)). It has been further developed during consultation with Natural England (NE), the Environment Agency (EA) and the Council’s Nature Conservation Officer.

1.3.2 This BDMP outlines measures for mitigation and management which have been developed to address the ecological effects identified through the Environmental Impact Assessment (EIA) and presented in the ES. The measures contained within this BDMP focus on the following receptors:

a. The Upper Mersey Estuary (UME) Local Wildlife Site (LWS);
b. Wigg Island LWS and Local Nature Reserve (LNR);
c. St Helens Canal LWS;
d. Manchester Ship Canal LWS;
e. Watercourses within the Study Area: Stewards Brook, Bowers Brook Spur, Bowers Brook, Latchford Canal, Halton Brook, and Bridgewater Canal;
f. Birds;
g. Great Crested Newts;
h. Bats; and
i. Water Voles.

1.5 Structure of this BDMP

1.5.1 Avian, terrestrial and aquatic ecological effects identified through the EIA process are interlinked. This is particularly relevant in the estuarine environment. The estuarine habitats, which make up the UME LWS are comprised of saltmarshes, mudflats and intertidal habitats and support aquatic organisms and estuarine flora. These organisms and flora in turn provide the food source which supports the birdlife of the Estuary. These factors are highly dependent on one another and changes to variables within the Estuary can have a knock on effect on this sensitive estuarine environment and subsequently the flora and fauna that it supports.

1.5.2 As a result this BDMP takes into consideration the interactive nature of this environment. All ecological mitigation that has been developed for the UME LWS is set out in Section 3.2 and 4.2 of this BDMP.

1.5.3 The BDMP is structured as follows:

1.5.4 Section 2: provides an outline of features having biodiversity value in the Project study area.

1.5.5 Sections 3 to 5: comprise the three main components of the BDMP; avian (Section 3), terrestrial (Section 4) and aquatic ecology (Section 5). Each of these components of the BDMP is supported by a series of appendices.
2. BIODIVERSITY VALUE OF THE STUDY AREA

Upper Mersey Estuary

2.1.1 There are a number of LWS\(^1\) and LNR located in the UME and Halton. These are designated primarily for wildfowl and waders but also because of the saltmarsh and associated intertidal habitats that are located upstream of the Silver Jubilee Bridge (SJB).

2.1.2 On the north bank of the Estuary is an area of saltmarsh known as Widnes Warth and on the south bank, is an area of saltmarsh known as Astmoor Saltmarsh. The Astmoor Saltmarsh is bordered by the Estuary and the Manchester Ship Canal. Wigg Island is also located on the edge of the Estuary abutting the Astmoor Saltmarsh. These areas, along with the Estuarine habitats between them, are designated as a LWS.

2.1.3 Wigg Island is also designated as a LNR and contains Wigg Island Community Park and comprises 8.7 hectares of woodland and 9.1 hectares of grassland. These habitats support a wide range of flora and fauna including breeding and visiting birds, butterflies and moths, dragonflies and damselflies and a large number of terrestrial invertebrates. An award winning visitor centre was opened on the site in November 2007.

2.1.4 The UME LWS supports a small but significant assemblage of wintering and migratory wildfowl and wading birds. This environment also supports an assemblage, albeit of limited species content and density, of marine invertebrates which, together with marine plant species, provide a food resource for the wildfowl and wading birds.

2.1.5 There are significant populations of breeding bird species including Priority Species, notably Skylark and Reed Bunting, which use the saltmarsh habitats.

Middle Mersey Estuary

2.1.6 Although the ES concludes that neither habitat nor biodiversity within the Middle Mersey Estuary will not be affected by the construction and operation of the Project it is important to set out information in relation to its European designation.

2.1.7 Immediately downstream of the SJB there are a number of sites having national and international designations for nature conservation purposes including:

a. The Mersey Estuary Site of Special Scientific Interest (SSSI) as designated under the Wildlife & Countryside Act (1981) (amended by the Countryside and Rights of Way Act 2000);

b. The Mersey Estuary Ramsar Site (as designated under the Ramsar Convention on wetlands of international importance);

b. The Mersey Estuary Special Protection Area (SPA) for Birds (as designated under the European Commission Council on the Conservation of Wild Birds (79/409/EEC) on April 1979); and

c. The Mersey Estuary European Marine Site.

2.1.8 The Ramsar Site, SPA and European Marine Site form part of a network of sites that are collectively known as Natura 2000.

---

\(^1\) Formerly known as Sites of Importance for Nature Conservation (SINCs)
2.1.9 The principal reason for the SPA designation is the occurrence of very large and internationally important populations of migratory wildfowl and wading birds. These birds are attracted to this area by its large and sheltered nature, grazed diverse flora and rich invertebrate fauna that live in the extensive areas of intertidal sand bank and mud-flats and creek and pool systems.

2.1.10 The conservation objective for the internationally important populations of regularly occurring migratory bird species states: ‘Subject to natural change, maintain in favourable condition the habitats for the internationally important populations of regularly occurring migratory bird species, under the Birds Directive; in particular:

- Intertidal sediments
- Rocky shores
- Saltmarsh’

2.1.11 The conservation objective for the internationally important assemblage of waterfowl states: ‘Subject to natural change, maintain in favourable condition the habitats for the internationally important assemblage of waterfowl, under the Birds Directive, in particular:

- Intertidal sediments
- Rocky shores
- Saltmarsh’

Watercourses

2.1.12 A number of watercourses located within the area surrounding the proposed alignment of the Project are considered to offer biodiversity value. These are:

a. The St Helens Canal LWS. Its biodiversity and nature conservation importance is associated with its eutrophic standing water habitats, reedbed margins and a small amount of developing wet woodland. It also supports good assemblages of fish species and breeding dragonflies.

b. The Manchester Ship Canal LWS. This canal is of significant botanical importance for the colonies of wild orchid and species–rich plant communities it supports. It also offers habitat for a range of butterflies species.

c. The Steward's Brook. Water voles have been recorded in this canal as noted at Paragraph 2.1.15.

d. Other watercourses in the study area include; the Bowers Brook spur, the Bowers Brook, The Latchford Canal, Halton Brook and the Bridgewater Canal.

Protected Species

2.1.13 A meta-population of Great Crested Newts (GCN) on the south side of the A557 Weston Point Expressway between the expressway and the nearby chemical works and in the vicinity of the Weston Link junction are likely to be affected by the construction and operation of the Project. GCN’s and their habitats are protected by European and National legislation.

2.1.14 Bats, which are also protected by European and National legislation, have been recorded along the Project corridor. Bat foraging and commuting was associated with the Manchester Ship Canal, the disused St. Helen’s Canal, the Bridgewater Canal, the disused Runcorn to Latchford Canal and Wigg Island. It is also likely that bats are using surrounding residential properties for roosting.

2.1.15 Although not identified during the ES surveys, water voles are likely to be present along the Steward's Brook. Similarly to bats, water voles are protected by European and National legislation.
3. **AVIAN ECOLOGY**

3.1 **Summary of Construction and Operational Effects**

3.1.1 **Table 1** below provides a schedule of predicted significant effects of the Project on avian receptors. These effects have been extracted from Chapter 10 of the ES where a detailed effect assessment can be found.

**Table 1: Summary of Significant Effects of the Project on Avian Receptors**

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Effect and ES Reference</th>
<th>Description of Effect</th>
<th>Mitigation / Management Option in BDMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Mersey Estuary LWS</td>
<td>Loss of saltmarsh and intertidal habitats ES: Paragraphs 10.17.60 to 10.17.94</td>
<td>Construction of structures and working areas</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1)</td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Disturbance to breeding, roosting, feeding and loafing and migratory birds ES: Paragraphs 10.17.60 to 10.17.114</td>
<td>Presence and movements of structures, machinery and personnel</td>
<td>Implementation of best practice pollution prevention techniques as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td></td>
<td>Disturbance to breeding, roosting, feeding and loafing and migratory birds and oiling of birds ES: Paragraph 10.17.111</td>
<td>Noise and pollution produced by machinery</td>
<td></td>
</tr>
<tr>
<td>Operational Effects</td>
<td>Disturbance to breeding, feeding, roosting and flying birds ES: Paragraphs 10.17.156 to 10.17.170</td>
<td>Presence of bridge structure</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1)</td>
</tr>
<tr>
<td></td>
<td>Disturbance to breeding, feeding, roosting birds and disorientation of birds ES: Paragraphs 10.17.171 to 10.17.173</td>
<td>Movements of traffic, noise and artificial light</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oiling of birds ES: Paragraphs 10.17.174 to 10.17.175</td>
<td>Pollution from oils and road run-off</td>
<td>Adoption of appropriate design standards as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td>Mersey Estuary European Site</td>
<td>Oiling of birds and ingestion of chemicals ES: Paragraphs 10.17.126 to 10.17.128</td>
<td>Pollution from oil and chemical spillages in the UME</td>
<td>Implementation of best practice pollution prevention techniques as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Pollution of birds using the intertidal habitats and river channels ES: Paragraphs 10.17.192 to 10.17.196</td>
<td>Pollution due to release of oils and other contaminants from traffic</td>
<td>Adoption of appropriate design standards as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td>Operational Effects</td>
<td>Oiling of birds ES: Paragraph 10.17.203</td>
<td>Construction activities and presence of the New Bridge</td>
<td>Avoidance of bird breeding season or adoption of appropriate precautions (Paragraph 3.2.3)</td>
</tr>
<tr>
<td>Manchester Ship Canal LWS</td>
<td>Disturbance to breeding birds ES: Paragraph 10.17.213</td>
<td>Construction activities and presence of the New Bridge</td>
<td>Avoidance of bird breeding</td>
</tr>
<tr>
<td>Wigg Island LWS and LNR</td>
<td>Disturbance to breeding birds</td>
<td>Construction activities and</td>
<td>Avoidance of bird breeding</td>
</tr>
</tbody>
</table>
### 3.2 Mitigation of Avian Effects

3.2.1 This section of the BDMP sets out the essential mitigation and management that is required to mitigate the direct and indirect construction and operational effects of the Project (as listed in Table 1 above) on birdlife that utilises the UME and surrounding terrestrial habitats.

**Upper Mersey Estuary LWS**

3.2.2 Details relating to the proposed mitigation scheme for the ecological effects of the Project on habitats and birds within the UME LWS are provided at Appendix 1 of this BDMP.

**Disturbance to Breeding Birds**

3.2.3 Vegetation clearance required as part of the construction of the Project will be carried out outside the breeding season (March to August inclusive) where possible. Where this is not possible all clearance will be preceded by an inspection by a competent ornithologist. Where nesting birds are identified they will be protected from damage until the young have fledged.

### 3.3 Monitoring

3.3.1 Appendix A3 of the COPE sets out a framework for avian ecological monitoring that will be implemented within the UME before, during and after construction of the Project.
4. **TERRESTRIAL ECOLOGY**

4.1 **Terrestrial Ecology Summary of Effects**

4.1.1 **Table 2** below provides a schedule of predicted significant effects of the Project on terrestrial ecology receptors. These effects have been extracted from Chapter 10 of the ES where a detailed effect assessment can be found. Relevant mitigation and management options in respect to the UME mitigation package are discussed above at Section 3.2, and information in relation to the protection of surface water quality features are detailed in the COPE.

**Table 2: Schedule of Significant Effects of the Project on Terrestrial Ecology Receptors**

<table>
<thead>
<tr>
<th>Location</th>
<th>Terrestrial Ecology Receptor Effect and ES Reference</th>
<th>Effect</th>
<th>Description of Effect</th>
<th>Mitigation / Management Option in BDMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Mersey Estuary LWS</td>
<td>Widnes Warth Saltmarsh and Astmoor Saltmarsh ES: Paragraphs 10.17.60 to 10.17.77</td>
<td>Loss of vegetation</td>
<td>Construction and use of stone haul road</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1) and implementation of measures to for saltmarsh restoration (Appendix 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loss of seedbank</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damage to soil structure</td>
<td>Construction of cofferdams and working areas for construction of piers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intertidal sand, silt or mudflats including sandbanks ES: Paragraphs 10.17.78 to 10.17.94</td>
<td>Loss of vegetation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loss of seedbank</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damage to soil structure</td>
<td>Use of hovercrafts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All habitats ES: Paragraphs 10.17.152 to 10.17.155 and 10.17.176 to 10.17.183</td>
<td>Pollution of saltmarsh and other intertidal habitats and river channels</td>
<td>Release of oils and other pollutants from traffic</td>
<td>Implementation of best practice pollution prevention techniques as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhibition of growth or dieback of vegetation</td>
<td>Shading of saltmarsh vegetation</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1)</td>
</tr>
<tr>
<td>Mersey Estuary European Marine Site</td>
<td>Habitats in the European Site ES: Paragraphs 10.17.126 to 10.17.131</td>
<td>Oiling and chemical contamination of waters and intertidal habitats in the European Site</td>
<td>Pollution from oil and chemical spillages in the UME</td>
<td>Implementation of best practice pollution prevention techniques as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td></td>
<td>All habitats ES: Paragraphs 10.17.192 to 10.17.196</td>
<td>Pollution of saltmarsh and other intertidal habitats and river channels</td>
<td>Pollution caused by the release of oils, petrol and other contaminants from traffic</td>
<td>Adoption of appropriate design standards as outlined in the COPE (Section 6.1)</td>
</tr>
<tr>
<td>St Helens Canal LWS</td>
<td>Vegetation ES: Paragraph</td>
<td>Loss of aquatic and water margin habitats and</td>
<td>Infilling a section of the Canal</td>
<td>Provision of compensatory habitat</td>
</tr>
<tr>
<td>Location</td>
<td>Terrestrial Ecology Receptor Effect and ES Reference</td>
<td>Effect</td>
<td>Description of Effect</td>
<td>Mitigation / Management Option in BDMP</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td><strong>Operational Effects</strong></td>
<td>Vegetation ES: Paragraph 10.17.203</td>
<td>Fragmentation of the canal habitat</td>
<td>Construction activities involving movements of machinery and noise.</td>
<td>Provision of compensatory habitat (Appendix 3)</td>
</tr>
<tr>
<td><strong>Manchester Ship Canal LWS</strong></td>
<td>Vegetation ES: Paragraph 10.17.207</td>
<td>Shading of canal vegetation and change to the local environment</td>
<td>Presence of the New Bridge structure.</td>
<td>Provision of compensatory habitat (Appendix 3)</td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Vegetation ES: Paragraph 10.17.212</td>
<td>Mechanical and trampling damage to soils, vegetation and storage of materials</td>
<td>Construction activities involving access, movements of machinery and personnel and storage of materials</td>
<td>Translocation of flora (Appendix 3)</td>
</tr>
<tr>
<td>Butterflies ES: Paragraph 10.17.213</td>
<td>Damage to butterflies</td>
<td>Construction activities</td>
<td>Translocation of butterfly flora (Appendix 3)</td>
<td></td>
</tr>
<tr>
<td><strong>Operational Effects</strong></td>
<td>Vegetation ES: Paragraphs 10.17.215 to 10.17.218</td>
<td>Inhibition of plant growth or other plant species requiring sunny habitats and moist soils</td>
<td>Presence of the New Bridge including shading and interception of rainfall.</td>
<td>Soil Treatment (Appendix 3)</td>
</tr>
<tr>
<td>Sparse vegetation and poor habitat for invertebrates and other fauna</td>
<td>Inhibition of plant growth</td>
<td>Compacted and poorly drained soils</td>
<td>Soil Treatment (Appendix 3)</td>
<td></td>
</tr>
<tr>
<td><strong>Wigg Island LWS and LNR</strong></td>
<td>Vegetation ES: Paragraphs 10.17.222 to 10.17.224</td>
<td>Loss of habitat and vegetation. Mechanical and trampling damage to soils, vegetation and plant species</td>
<td>Construction activities, involving access, movements of machinery and personnel and storage of materials</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1)</td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Butterflies ES: Table 10.60</td>
<td>Damage and losses of butterfly and other invertebrate habitats</td>
<td>Construction activities</td>
<td>Landscaping (Appendix 3)</td>
</tr>
<tr>
<td>Aesthetic appeal ES: Paragraphs 10.17.226 to 10.17.228</td>
<td>Reduction in aesthetic appeal and tranquility of the LNR</td>
<td>Construction activities and presence of the New Bridge structure</td>
<td>Landscaping (Appendix 3)</td>
<td></td>
</tr>
<tr>
<td><strong>Operational Effects</strong></td>
<td>Vegetation ES: Paragraphs 10.17.229 to 10.17.230</td>
<td>Inhibition of plant growth of herbaceous and woody species</td>
<td>Presence of the New Bridge structure including shading.</td>
<td>Management of Astmoor and Widnes Warth Saltmarshes (Appendix 1)</td>
</tr>
<tr>
<td>Aesthetic appeal</td>
<td>Reduction in aesthetic appeal and tranquility of the LNR</td>
<td>Interception of rainfall by the New Bridge structure</td>
<td>Landscaping (Appendix 3)</td>
<td></td>
</tr>
<tr>
<td>ES: Paragraph 10.17.230</td>
<td>Aesthetic appeal</td>
<td>Presence of moving traffic, noise and artificial lighting</td>
<td>Landscaping (Appendix 3)</td>
<td></td>
</tr>
</tbody>
</table>

**Terrestrial Ecology Receptor**: The term refers to the specific ecological receptors that are affected by the construction activities. These receptors could include fauna, flora, vegetation, and other components of the local environment.

**Effect** and **ES**: These terms refer to the specific impacts or changes observed as a result of the construction activities. **Effect** refers to the observable change, while **ES** refers to the ecological significance of these changes.

**Description of Effect** and **Mitigation / Management Option in BDMP**: These columns provide detailed descriptions of the effects observed and the management options implemented to mitigate these effects.
<table>
<thead>
<tr>
<th>Location</th>
<th>Terrestrial Ecology Receptor Effect and ES Reference</th>
<th>Effect</th>
<th>Description of Effect</th>
<th>Mitigation / Management Option in BDMP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Bats ES: Table 10.61</td>
<td>Disturbance to bats</td>
<td>Presence of moving traffic, noise and artificial lighting</td>
<td>Landscaping (Appendix 3)</td>
</tr>
<tr>
<td>Operational Effects</td>
<td>Bats ES: Paragraphs 10.17.252 to 10.17.253</td>
<td></td>
<td></td>
<td>Implementation of bat mitigation (Appendix 3)</td>
</tr>
<tr>
<td><strong>Weston Link Junction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Great Crested Newts ES: Paragraphs 10.17.255 to 10.17.259</td>
<td>Loss of GCN foraging habitat</td>
<td>Construction of the Project including demolition of buildings, felling of trees, crossing of canals and de-linking</td>
<td></td>
</tr>
<tr>
<td>Operational Effects</td>
<td>Great Crested Newts ES: Paragraph 10.17.262</td>
<td>Loss of GCN foraging habitat</td>
<td>Traffic use of the Weston Point Expressway bringing traffic closer to the GCN ponds along part of the Expressway.</td>
<td>Improvement of great crested newt mitigation (Appendix 3)</td>
</tr>
<tr>
<td><strong>St Michael’s Golf Course</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Effects</td>
<td>Water Voles ES: Paragraphs 10.17.263 to 10.17.267</td>
<td>Disturbance to water voles</td>
<td>Construction of Toll Plazas and associated highway works in the former St Michael’s Golf Course and the culverting of a section of ditch</td>
<td>Implementation of water vole mitigation (Appendix 3)</td>
</tr>
<tr>
<td>Operational Effects</td>
<td>Water Voles ES: Paragraphs 10.17.269 to 10.17.270</td>
<td>Disturbance to water voles</td>
<td>Presence of culvert, traffic movements including noise and light and the use of toll booths in the former St Michael's Golf Course</td>
<td></td>
</tr>
</tbody>
</table>
4.2 Terrestrial Ecology Mitigation

Upper Mersey Estuary LWS

4.2.1 Section 3.2 and Appendix 1 provides details on the mitigation package that is to be adopted as part of the Project at the Astmoor and Widnes Warth Saltmarshes. This package will mitigate the effects of the Project, during both construction and operation, on avian and habitat receptors.

4.2.2 Appendix 2 provides further details the desired saltmarsh plant communities and their management requirements.

Terrestrial Ecology Habitats

4.2.3 Appendix 3 provides details on the mitigation package that is to be adopted as part of the Project for habitats and protected species outside the UME LWS which are likely to be affected by the Project (as detailed in Table 2). This package will mitigate the effects of the Project, during both construction and operation on terrestrial ecology receptors.

4.3 Monitoring

4.3.1 As stated at Section 3.3 Appendix B3 sets out a framework for ecology monitoring that will be implemented within the UME LWS before, during and after construction of the Project.
## 5. AQUATIC ECOLOGY

### 5.1 Summary of Aquatic Ecological Effects

5.1.1 **Table 3** below provides a schedule of predicted significant effects of the Project on aquatic ecology receptors. These effects have been extracted from Chapter 11 of the ES where a detailed effect assessment can be found.

**Table 3: Schedule Significant Effects of the Project on Aquatic Ecology Receptors**

<table>
<thead>
<tr>
<th>Location</th>
<th>Aquatic Ecology Receptor</th>
<th>Effect</th>
<th>Description of Effect</th>
<th>Mitigation / Management Option in BDMP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine mammals</td>
<td></td>
<td></td>
<td></td>
<td>Establishment of a safety zone to protect marine mammals. Appendix A4 of COPE</td>
</tr>
<tr>
<td>Intertidal and subtidal habitat</td>
<td>Release of pollutants</td>
<td></td>
<td>Erosion of sediments/spillages and leakages of material. Potential release of contaminants within intertidal zone e.g. planings containing tar.</td>
<td>Removal of excavated material and dewater to appropriate disposal sites. Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Store hazardous materials in secure containers to avoid spillage and leakage. COPE (Section 6.1)</td>
</tr>
<tr>
<td>Infimauna and benthic algae</td>
<td></td>
<td></td>
<td>Potentially direct damage to organisms if above Predicted No Effect Concentrations (PNECs) for specific taxa. Bioaccumulation of contaminants along food chain.</td>
<td>Removal of excavated material and dewater to appropriate disposal sites. Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Store hazardous materials in secure containers to avoid spillage and leakage.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Impact</th>
<th>Description and Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Epifauna and fish</strong></td>
<td>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.</td>
<td>COPE (Section 6.1) Removal of excavated material and dewater to appropriate disposal sites. Adhere to relevant waste legislation (e.g. Duty of Care Guidance). Store hazardous materials in secure containers to avoid spillage and leakage.</td>
</tr>
<tr>
<td><strong>Intertidal and subtidal habitat</strong></td>
<td>Habitat loss/disruption</td>
<td>Construction of tower, piers cofferdams and stone haul road. Direct loss of sediment habitat, tower surfaces would create a small area of new habitat.</td>
</tr>
<tr>
<td><strong>Infauna and benthic algae</strong></td>
<td></td>
<td>Construction of tower, piers cofferdams and stone haul road. Direct loss of sediment habitat, tower surfaces would create a small area of new habitat.</td>
</tr>
<tr>
<td><strong>Epifauna and fish</strong></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Canal fauna and flora</strong></td>
<td></td>
<td>Infilling of section of the St. Helens Canal. Displacement of organisms and reduction of available habitat for aquatic flora and fauna.</td>
</tr>
</tbody>
</table>

**Operation**

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Impact</th>
<th>Description and Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canal fauna and flora</strong></td>
<td>Guanotrophy:</td>
<td>Potential adverse impact due to increased organic input from roosting birds. Depletion of</td>
</tr>
</tbody>
</table>

DRAFT
5.2 Aquatic Ecology Mitigation and Monitoring

5.2.1 Appendix A4 of the COPE sets out a framework for aquatic ecology mitigation and monitoring that will be implemented before, during and after construction of the Project.