Extra MSA Group

Warrington Motorway Service Area, J11 M62

Environmental Statement

Part 2 – Water Resources Technical Paper [3]

Revision 07/08/2019

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Report Author	Rachel Graham, Wardell Armstrong LLP
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1. Introduction

1.1. The following Technical Paper has been written by Wardell Armstrong LLP and it considers the potential issues arising from the Proposed Development in relation to the hydrological and hydrogeological environment. This Technical Paper assesses the potential impacts upon:

- surface waters including rivers and surface water bodies;
- groundwater;
- private water supplies and other water abstractions; and
- potential water dependent hydro-ecological sites.

1.2. This Water Resources ES Technical Paper has been prepared by Wardell Armstrong LLP on behalf of the Extra MSA Group. This Technical Paper assesses the impact of the development proposals upon the water environment.

1.3. The aims of the assessment are to:

- Establish the baseline condition of the water environment;
- Identify water environment sensitive receptors;
- Identify potential likely impacts as a result of the Proposed Development and arrive at a conclusion about the likely effect of this;
- Discuss embedded design mitigation and good industry practice that would be implemented during the Proposed Development;
- Determine the scale of any potential effects, assuming design mitigation and good industry practice, by assessing the degree of sensitivity of the hydrological and hydrogeological receptors and the potential magnitude of change from the baseline condition;
- Establish if the scale of the effect is significant;
- If required, provide specific mitigation measures; and
- Identify any cumulative and residual effects.

1.4. This ES Technical Paper has been prepared by Rachel Graham (BSc (Hons), MSc, MCIWEM, MIEnvSc), Senior Environmental Scientist and Lauren Ballarini (BSc (Hons), MSc, CGeol, FGS) Technical Director, who are the competent experts preparing this chapter. The Flood Risk Assessment and Drainage Strategy (Appendix 3.1) has been prepared by Stephen Miller (MEng (Hons), CEng, MICE), Principal Engineer and Julian Symmons (BSc (Hons), CEng, MICE), Technical Director.

1.5. Full details of the Proposed Development and development parameters for assessment are included in the introductory chapters to the ES Part 1 Report.

2. Documents Consulted

2.1. A qualitative assessment will be undertaken using a combination of professional judgment, legislation and other statutory policy and guidance, which will be considered in the preparation of this assessment. Legislation and other statutory policy and guidance includes:

- European Directive: The Water Framework Directive (2000/60/EC);
- European Directive: The Groundwater Daughter Directive (2006/118/EC);
- European Directive: The Priority Substances Directive (2008/105/EC);
- Act of Parliament: The Environment Protection Act 1990;
- Act of Parliament: The Land Drainage Act 1991;
- Act of Parliament: The Water Resources Act 1991, Water Act 2003 and Water Act 2014;
- Act of Parliament: Flood and Water Management Act 2010;
- National Policy: The National Planning Policy Framework 2019;
- National Policy: Planning Practice Guidance: Flood Risk and Costal Change (2014);
- Local Policy: Warrington Borough Council Local Plan Core Strategy 2014;
- Local Policy: Warrington Borough Council Draft Local Plan;
- Local Policy: Warrington Borough Council Strategic Flood Risk Assessment (SFRA) 2008;
- Local Policy: Warrington Borough Council Surface Water Management Plan (SWMP) 2012;
- Local Policy: Warrington Borough Council Mid Mersey Water Cycle Study (WCS) 2011;
- CIRIA C741: Environmental Good Practice on Site Guide (4th edition);
- CIRIA C750: Groundwater control: design and practice (2nd edition);
- CIRIA C753 Sustainable Urban Drainage Systems Manual;
- CIRIA C532 Control of Water Pollution from Construction Sites;
- CIRIA C650 Environmental Good Practice on Site (Expansion of C502);
- CIRIA C689 Culvert Design & Operational Guide;
- Pollution Prevention Guidelines (PPG) 1 General Guide to The Prevention of Pollution;
- PPG2 Above Ground Oil Storage;
- PPG4 Treatment & Disposal of Sewage Where No Foul Sewer;
- PPG5 Works & Maintenance In, Or Near Water;
- PPG6 Working at Construction and Demolition Sites;
- PPG8 Safe Storage & Disposal of Used Oils;
- PPG10 Pollution Prevention Guidelines Highway Depots;
- PPG21 Polluting Incident Response Planning;
- PPG22 Dealing with Spills;
- Highways Agency Trunk Road Maintenance Manual: Volume 2 – Routine and Winter Maintenance Code
- APEA and Energy Institute Design, construction, modification, maintenance and decommissioning of filling stations (known as the Blue Book), 4th edition;
- UK Technical Advisory Group on the WFD, UK Environmental Standards & Conditions (Phase 2), Final, 2008; and

- Environment Agency's Groundwater Protection guides including but not limited to: 'Protect groundwater and prevent groundwater pollution'; 'groundwater protection technical guidance'; and 'groundwater protection position statements'.

2.2. It is noted that all Pollution Prevention Guidance (PPG)s have been withdrawn by the Environment Agency (EA), as the legislative requirements contained within the documents are, in many cases, no longer correct; however, the PPGs are still considered to be a relevant and effective source of best practice information and are widely used and accepted.

2.3. The UK government have advised that following the exit of the UK from the EU, the EU Withdrawal Act 2018 will ensure that all existing EU environmental law will continue to operate in UK law[1]. The UK government and devolved administrations will "*amend current legislation to correct references to EU legislation* […] *and ensure we meet international agreement obligations*".

European Directive: The Water Framework Directive (2000/60/EC)

2.4. Directive 2000/60/EC of the European Parliament and Council (the Water Framework Directive) came into force on 22 December 2000 and established a framework for community action in the field of water policy. The WFD required member states to aim to reach good chemical and ecological status in inland and coastal waters by 2015. The WFD is designed to enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, to promote sustainable water use, to reduce pollution of water and to ensure a progressive reduction in groundwater pollution. The WFD established a strategic framework for managing the water environment and requires a Management Plan for each river basin to be developed every six years. In cases where good status/potential could not be achieved by 2015, a provision is given under Article 4.4 of the WFD extending the deadline to 2021 or 2027. The date has been extended to 2027 in respect of a large number of waterbodies. The competent authority (in England) for delivering the WFD is the EA.

European Directive: The Groundwater Daughter Directive (2006/118/EC)

2.5. Directive 2006/118/EC of the European Parliament and Council (the Groundwater Daughter Directive) came into force on 12 December 2006 and aims to protect groundwater against pollution and deterioration. The Groundwater Daughter Directive was developed in

[1] DEFRA (2018) Upholding Environmental Standards if there's no Brexit Deal [online]. Accessed 12.04.2019. Available at: https://www.gov.uk/government/publications/upholding-environmental-standards-if-theres-no-brexit-deal/upholding-environmental-standards-if-theres-no-brexit-deal

response to the requirements of Article 17 of the WFD (2000/60/EC) and specifies measures to prevent and control groundwater pollution (by providing criteria for the assessment of good groundwater chemical status, criteria for the identification and reversal of significant and sustained upward trends and for defining a baseline status).

European Directive: The Priority Substances Directive (2008/105/EC)

2.6. Directive 2008/105/EC of the European Parliament and Council (the Priority Substances Directive) came into force on 16 December 2008 and sets environmental quality standards in the field of water policy. The Priority Substances Directive amended and subsequently repealed Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amended the WFD of the European Parliament and Council. The Priority Substances Directive was developed in response to the requirements of Article 16 of the WFD and requires the identification of priority substances to set Environmental Quality Standards (EQSs) for the concentrations of the priority substances in surface waterbodies and to review periodically the list of priority substances.

Act of Parliament: The Environment Protection Act 1990

2.7. The Environmental Protection Act 1990 brought in a system of integrated pollution control for the disposal of wastes to land, water and air and covers statutory nuisances.

Act of Parliament: The Land Drainage Act 1991

2.8. The Land Drainage Act 1991 requires the owner of a watercourse to maintain the watercourse in such a condition that the free flow of water is not impeded. The owner must accept the natural flow from upstream but need not carry out work to cater for increased flows resulting from some types of works carried out upstream, for example a new housing development.

Act of Parliament: The Water Resources Act 1991, Water Act 2003 and Water Act 2014

2.9. The Water Resources Act 1991 aims to prevent and minimise pollution of water (surface and groundwater) and tasks the policing of this Act to the EA. The Water Act 2003 amended the Water Resource Act 1991 to improve long-term water resource management by making changes to licencing. The Water Act 2003 also aims to promote water conservation, increase competition, strengthen the voice of consumers and promote the suitable use of water resources. The Water Act 2014 aims to reform the water industry to make it more responsive to customers and to increase the resilience of water supplies to droughts and

flooding. It also brings in measures to address the availably and affordability of insurances in high flood risk areas.

Act of Parliament: Flood and Water Management Act 2010

2.10. The Flood and Water Management Act 2010 was introduced to provide legislation to address the threat of flooding and water scarcity, both of which are predicted to increase with climate change. The Act:

- requires the Environment Agency to create a National Flood and Coastal Erosion Risk Management Strategy;
- requires leading local flood authorities to create local flood risk management strategies;
- enables the Environment Agency and local authorities more easily to carry out flood risk management works;
- introduces a more risk-based approach to reservoir management;
- changes the arrangements that would apply should a water company go into administration;
- enables water companies more easily to control non-essential uses of water, such as the use of hosepipes;
- enables water companies to offer concessions to community groups for surface water drainage charges;
- requires the use of sustainable drainage systems in certain new developments; and
- introduces a mandatory building standard for sewers.

National Policy: The National Planning Policy Framework 2019

2.11. The Department for Communities and Local Government (DCLG) published the National Planning Policy Framework (NPPF) in March 2012 and it was revised in February 2019. The revised NPPF replaced the guidance previously contained within Planning Policy Statement 25 (PPS25): Development and Flood Risk. The revised NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. The revised NPPF contains numerous paragraphs concerning water resources, flooding, water quality and protection of the environment during development.

National Policy: Planning Practice Guidance: Flood Risk and Costal Change (2014)

2.12. In March 2014, the DCLG published the Planning Practice Guidance (PPG), which replaced the Technical Guidance to the NPPF. This document provides additional guidance to local planning authorities to ensure the effective implementation of the planning policies set out in the NPPF on development in areas at risk of flooding. It identifies that inappropriate development in areas at risk of flooding should be avoided by directing development away

from areas at highest risk. Where development is necessary, it should be made flood resilient without increasing flood risk elsewhere.

Local Policy: Warrington Borough Council Local Plan Core Strategy 2014

2.13. The Warrington Local Plan Core Strategy was adopted on 21 July 2014. The Local Plan Core Strategy is the overarching strategic policy document in the Local Planning Framework. It sets out the planning framework for guiding the location and level of development in the borough up to 2027.

2.14. Policy QE 4 Flood Risk states:

"The Council will only support development proposals where the risk of flooding has been fully assessed and justified by an agreed Flood Risk Assessment.

A site specific Flood Risk Assessment is required for:

- *proposals of 1 hectare or greater in Flood Zone 1 and Critical Drainage Areas as defined by the SFRA;*
- *all proposals for new development in Flood Risk Zones 2 and 3, and*
- *proposed minor development or change of use in Flood Risk Zones 2 and 3 where a more vulnerable use may be susceptible to other sources of flooding.*

The Flood Risk Assessment should also address, if required, the sequential and exceptions tests as set out in National Planning Policy.

Where the sequential and exception tests are satisfied, the Council will require development proposals to:

- *provide safe and clear access and egress routes in the event of a flood;*
- *manage surface water run-off to ensure that flood risk is not increased and that a reduction of at least 30% will be sought on previously developed land, rising to a minimum of 50% in Critical Drainage Areas or in areas susceptible to intermediate or high risk surface water flooding;*
- *use Sustainable Drainage Systems that incorporate natural drainage, rather than using traditional piped systems in new developments unless it can be demonstrated that such techniques are impractical or would present an unacceptable pollution risk;*
- *provide compensatory storage where development is proposed in undefended areas of the floodplain;*
- *ensure that the layout and design of a site is considered to provide the opportunity to provide flood resilience measures and reduce flood risk within the development;*
- *apply a sequential approach at a site level to minimise risk by directing the most vulnerable development to areas of lowest risk;*
- *avoid the use of culverting and building over watercourses and where practical to re-open existing culverts;*
- *ensure that appropriate mitigation is included within the design of the development to make it safe for the future users of the site without adversely affecting others;*
- *ensure that developers have considered the impacts of climate change to ensure that the future users of the development are not put at additional danger of flooding, which may be exacerbated by climate change over the lifetime of the development.*

In addition, in areas identified by the Council as being at intermediate and high risk of surface water flooding, development proposals that are greater than 0.5 hectares should be supported by a Flood Risk Assessment which considers information in Warrington's Strategic Flood Risk Assessment and Preliminary Flood Risk Assessment to demonstrate that the development;

- *is not at risk from existing drainage systems or overland flows;*
- *will make a positive contribution to managing or mitigating flood risk;*
- *will not adversely affect existing flooding conditions*.

2.15. Policy QE 6 Environment and Amenity Protection states:

"*The Council, in consultation with other Agencies, will only support development which would not lead to an adverse impact on the environment or amenity of future occupiers or those currently occupying adjoining or nearby properties, or does not have an unacceptable impact on the surrounding area. The Council will take into consideration the following:*

- *The integrity and continuity of tidal and fluvial flood defences;*
- *The quality of water bodies, including canals, rivers, ponds and lakes;*
- *Groundwater resources in terms of their quantity, quality and the ecological features they support;*
- *Land quality;*
- […]

Proposals may be required to submit detailed assessments in relation to any of the above criteria to the Council for approval.

Where development is permitted which may have an impact on such considerations, the Council will consider the use of conditions or planning obligations to ensure any appropriate mitigation or compensatory measures are secured.

Development proposals on land that is (or is suspected to be) affected by contamination or ground instability or has a sensitive end use must include an assessment of the extent of the issues and any possible risks. Development will only be permitted where the land is, or is made, suitable for the proposed use.

Additional guidance to support the implementation of this policy is provided in the Design and Construction and Environmental Protection Supplementary Planning Documents."

Local Policy: Warrington Borough Council Draft Local Plan

2.16. Warrington's Proposed Submission Version Local Plan (draft Local Plan) has been approved for consultation. Once adopted, the Local Plan will shape, guide and influence how the Borough develops over the next 20 years.

2.17. Draft policy ENV2 Flood Risk and Water Management states:

"General Principles

- *1. Development should be focused towards areas at the lowest risk of flooding from all sources.*

- *2. Sustainable water management measures must be integrated into developments to reduce flood risk across the Borough and to avoid adverse impacts on water quality and quantity.*
- *3. New development should not result in increased flood risk from any source, or cause*
- *other drainage problems, either on the development site or elsewhere.*
- *4. No development should take place within 8m of the top of the bank of a watercourse either culverted or open, or within 8 metres of a raised flood defence, such as a flood wall or a flood embankment, unless this approach is supported by the Environment Agency and Warrington Borough Council as the Lead Local Flood Authority.*

Development proposals

- *5. The Council will only support development proposals where the risk of flooding has been fully assessed, understood and justified, with the implementation of appropriate mitigation measures where necessary.*
- *6. A site specific Flood Risk Assessment is required for:*
    - *a. development proposals of 1 hectare or greater in Flood Zone 1;*
    - *b. any development proposals within Flood Zone 1, which has critical drainage problems (as notified to the Local Planning Authority by the Environment Agency);*
    - *c. all proposals for new development (including minor development and change of use) in Flood Zones 2 & 3; and*
    - *d. development proposals or a change of use to a more vulnerable class that might be susceptible to other sources of flooding.*
- *7. The Flood Risk Assessment should also address, if required, the Sequential and Exceptions tests as set out in National Planning Policy, and should take into account all sources of flooding identified in the Warrington Strategic Flood Risk Assessment (SFRA).*
- *8. The Council will require development proposals to:*
    - *a. provide safe and clear access and egress routes in the event of a flood;*
    - *b. manage surface water runoff to ensure that flood risk is not increased;*
    - *c. use Sustainable Drainage Systems that reflect the principles set out in the adopted Warrington Sustainable Drainage Systems (SuDS) Design and Technical Guidance, unless it can be demonstrated that such techniques are impractical or would present an unacceptable pollution risk;*
    - *d. provide compensatory storage where development is proposed in undefended areas of the floodplain;*
    - *e. ensure that the layout and design of a site is considered to provide the opportunity to provide flood resilience measures and reduce flood risk within the development;*
    - *f. apply a sequential approach at a site level to minimise risk by directing the most vulnerable development to areas of lowest risk;*
    - *g. avoid the use of culverting and building over watercourses and where practical to re-open existing culverts;*
    - *h. ensure that appropriate mitigation is included within the design of the development to make it safe for the future users of the site without adversely affecting others;*
    - *i. ensure that developers have considered the impacts of climate change to ensure that the future users of the development are not put at additional danger of flooding, which may be exacerbated by climate change over the lifetime of the development. Climate Change allowances should be in accordance with the latest Government guidance;*

- *j. Consider the connectivity and condition of watercourses within the development and make improvements where required;*
- *k. Make an assessment of downstream watercourse to ensure their suitability and effectiveness; and*
- *l. have regard to the Sankey Catchment Action Plan when assessing flood risk and any appropriate mitigation measures.*

- *9. In addition, in areas identified by the Council as being at intermediate and high risk of surface water flooding, development proposals that are greater than 0.5 hectares should be supported by a Flood Risk Assessment which considers information in Warrington's Strategic Flood Risk Assessment and Preliminary Flood Risk Assessment to demonstrate that the development:*
  - *a. is not at risk from existing drainage systems or overland flows;*
  - *b. will make a positive contribution to managing or mitigating flood risk; and*
  - *c. will not adversely affect existing flooding conditions.*
- *10. The Council will expect surface water to be discharged in the following order of priority:*
  - *a. An adequate soakaway or some other form of infiltration system.*
  - *b. An attenuated discharge to surface water body.*
  - *c. An attenuated discharge to public surface water sewer, highway drain or another drainage system.*
  - *d. An attenuated discharge to public combined sewer.*
- *11. Applicants wishing to discharge to public sewer will need to submit clear evidence demonstrating why alternative options are not available. The expectation will be for only foul flows to communicate with the public sewer.*
- *12. Applicants will be expected to conform to the following discharge requirements unless site-specific policies indicate otherwise:*
  - *a. On greenfield sites, applicants will be expected to demonstrate that the current natural discharge solution from a site is at least mimicked.*
  - *b. On previously developed land, applicants will also be expected to follow the surface water hierarchy.*
  - *c. Thereafter, any proposal based on a proposed reduction in surface water discharge from a previously developed site should target a reduction to greenfield run-off rate. A reduction of at least 30% will be sought on previously developed land, rising to a minimum of at least 50% in Critical Drainage Areas (as defined in Warrington's Strategic Flood Risk Assessment) or in areas susceptible to intermediate or high risk surface water flooding. In demonstrating a reduction, applicants should include clear evidence of existing positive operational connections from the site with associated calculations on rates of discharge.*
- *13. Development proposals will be expected to incorporate sustainable drainage systems in accordance with the requirements of national planning policy. The preference will be for new development to incorporate infiltration based systems and thereafter surface level sustainable drainage systems with multi-functional benefits as opposed to underground tanked storage systems for the management of surface water. Applicants will need to submit clear evidence where surface level sustainable drainage features are not proposed.*
- *14. Any development proposal which is part of a wider development / allocation should demonstrate how the site delivers foul and surface water drainage as part of a wider strategy having regard to interconnecting phases of development. It will be necessary to ensure the drainage proposals are part of a wider, holistic strategy which coordinates the approach to drainage between phases, between developers, and over a number of*

years of construction. Applicants will be expected to include details of how the approach to foul and surface water drainage on a phase of development has regard to interconnecting phases within a larger site. Infrastructure should be sized to accommodate flows from interconnecting phases and drainage strategies should ensure a proliferation of pumping stations is avoided on a phased development. This will ensure a comprehensive approach to drainage and that any early phases of development provide the drainage infrastructure to meet the needs of any later interconnecting phases of development. In delivering drainage as part of a wider strategy, applicants will also be expected to ensure unfettered rights of discharge between the various parcels of development within a wider development to prevent the formation of 'ransom situations' between separate phases of development.

- *15. Approved development proposals will be expected to be supplemented by appropriate maintenance and management regimes for surface water drainage schemes.*
- *16. Applicants should consider what contribution landscaping proposals can make to reducing surface water discharge. This can include hard and soft landscaping such as permeable surfaces to reduce the volume and rate of surface water discharge.*"

2.18. Draft policy ENV8 Environmental and Amenity Protection states:

"*General Principles*

- *1. The Council requires that all development is located and designed so as not to result in a harmful or cumulative impact on the natural and built environment, and/or general levels of amenity.*
- *2. Development proposals, as appropriate to their nature and scale, should demonstrate that environmental risks have been evaluated and appropriate measures have been taken to minimise the risks of adverse impacts to air, land and water quality, whilst assessing vibration, light and noise pollution both during their construction and in their operation. […]*
  Water Quality
- *9. Development proposals will not be permitted where it would have an adverse effect on the quality or availability of groundwater resources, watercourses or water bodies.*
  General Amenity Protection
- *[…] 15. Detailed assessments may be required to address any of the above criteria and will need to be submitted to the Council for approval. Where necessary information from assessments is absent to enable consideration of a specific matter, conditions may be recommended or the application refused based on lack of supporting information.*
- *16. Additional guidance to support the implementation of this policy is provided in the Design and Construction and Environmental Protection Supplementary Planning Documents."*

Local Policy: Warrington Borough Council Strategic Flood Risk Assessment (SFRA) 2008

2.19. JBA Consulting was commissioned by Warrington Borough Council to undertake the Warrington Strategic Flood Risk Assessment (SFRA). The SFRA is a planning tool that enables the council to assess and implement sustainable development away from vulnerable flood risk areas. It sets out the procedures to be followed when assessing the suitability of sites for

development in the future and for determining the acceptability of potential sites for development in terms of flood risk.

Local Policy: Warrington Borough Council Surface Water Management Plan (SWMP) 2012

2.20. The council has produced a Surface Water Management Plan (SWMP) which studies the risk from surface water flooding and sets out a framework for managing the risk now and in the future.

Local Policy: Warrington Borough Council Mid Mersey Water Cycle Study (WCS) 2011.

2.21. The Water Cycle Study (WCS) provides a strategic overview of water infrastructure and environmental capacity so as to inform the development of the Local Development Framework and associated growth strategies for each of the respective authorities.

3. Consultations

3.1. Table 3.1 presents a summary of the correspondence undertaken with statutory consultees in regard to the preparation of this Technical Paper and associated appendices.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Data Request	30/11/2018	Highway England	Email	Requested M62 Junction 11 drainage plans.	Data was received on 04/12/2018
Data Request	15/01/2019	Environment Agency	Email	Request of environmental data: abstractions, discharges, groundwater, flooding, Water Framework Directive report, historic and licenses waste facilities and landfills.	Data was received on 31/01/2019
Data Request	15/01/2019	Warrington Borough Council	Email	Request of environmental information: private water supplies	Data was received on 21/01/2019
Technical Standard Consultation	13/02/2019	Warrington Borough Council	Letter	EIA Regulation 2017 Regulation 15 Scoping Opinion response	Noted
Data Request and Technical Standard Agreement	17/02/2019	Warrington Borough Council	Email/Telephone Conference	Historical flood risk request and permitted surface water drainage discharge and climate change standards.	Agreed on 15/04/2019
Data Request	04/04/2019	Biffa	Email/Telephone Conference	Restored Risley Landfill surface water drainage details.	Data was received on 8/04/2019 and 11/04/2019
Technical Standard Consultation	09/04/2019	Environment Agency	Meeting	Technical discussions on peat treatment, ecology, groundwater, flood risk, river diversion and drainage	Ongoing
Technical Standard Consultation	10/04/2019 09/04/2019 29/07/2019	Warrington Borough Council as Lead Local Flood Authority	Emails/Telephone Conference	Technical discussions on flood risk and surface water drainage strategy	Ongoing

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Pre-application Advice	10/05/2019	Warrington Borough Council: Engineering & Flood Risk Manager	Email	Although the Site is within Flood Zone 1, as the Proposed Development is over 1ha a Flood Risk Assessment and a drainage strategy are required.	A Flood Risk Assessment and Drainage Strategy have been including in Appendix 3.1.
Technical Standard Consultation	01/07/2019	United Utilities	Email	Consultation on foul water connection to public sewer options.	Foul water connection point to public sewer in Leacroft Road agreed.

Table 3.1: Summary of Consultations and Discussions

3.2. A summary of scoping opinion responses received that are relevant to Water Resources are included within Table 3.2.

Consultee	Abridged Comments	Comments
Croft Parish Council	There are concerns about the impact of this development on the water catchment / drainage area. The scoping exercise categorises the underlying sub-strata as 'principal aquifer'. The qualitative risk assessment attributes a 'moderate to high' risk to property / environment against groundwater vulnerability. There are added concerns about the combined impact of HS2 and this proposal on the water catchment / drainage area.	Section 8 provides an assessment of the potential effect of the Proposed Development on groundwater and surface water receptors, while Section 9 provides details of mitigation measures. The water environment related cumulative effect of HS2 and the Proposed Development has been Assessed in Section 11
Culcheth and Glazebury Parish Council	The proposal includes references to drainage. This is a major concern due to the runoff from the landfill site, and the area being located within a groundwater protection zone. This is currently mitigated by attenuation ponds to prevent land to the north from flooding. There are concerns that the addition of impermeable surfaces adjacent to Silver Lane Brook will impact Silver Lane Brook, which flows north into Willow Brook, in turn joining Glaze Brook to the east. Both watercourses are within a floodplain which includes extreme flood. Drainage impacts should include land to the north, up to and including watercourses in Culcheth. The land adjacent to the landfill site is shown as moss land on historic maps. Moss land […] [has] wider impacts on drainage, therefore the link to Manchester Mosses should be investigated.	Section 6 and 8 provides an assessment of the potential effect of the Proposed Development on surface water receptors including Silver Lane Brook, Willow Brook and Glaze Brook. Also see Appendix 3.1 - . The Conceptual Site Hydrogeological Model (CSHM) considers the potential for a pathway with the Manchester Mosses.

Consultee	Abridged Comments	Comments
Ecology Unit, Tameside Metropolitan Borough	The Site is within 1km of parts of the Manchester Mosses Special Area of Conservation, in particular Holcroft Moss and Risley Moss. […] recommend that potential impacts on the special nature conservation interests of these sites are properly considered. The potential of the development to cause indirect hydrological changes will need to be assessed.	The CSHM in Section 6 considers the potential for a pathway with the Manchester Mosses.
Engineering and Flood Risk Manager, Warrington Borough Council	The asset and flood risk team have assessed the environmental impact scoping report and have no issues with the proposals for this development in relation to surface water management.	Noted.
Environment Agency	The watercourse that flows through the western part of the Site is Silver Lane Brook and is designated "main river". Under the Environmental Permitting (England and Wales) Regulations 2016, a permit may be required from the EA for any proposed works or structures, in, under, over or within eight metres of the Brook. The main river Silver Lane Brook and some non-main watercourses are within the boundary of the proposed site, with some of the Proposed Development on these watercourses. As part of this development we do not wish to see culverting of watercourses. A Water Framework Directive (WFD) assessment may be required. WFD assessment must demonstrate that the proposed scheme does not: - Cause deterioration in the status of any water body through deterioration in the status of the Biological Quality Elements (BQEs), or; - Compromise the ability of the water body to achieve its WFD status objectives And should where possible: - Indicate how the proposed scheme contribute to the delivery of WFD objectives. It will be essential to ensure that the development is carried out in such a manner as to protect and prevent pollution of groundwater and surface water. The scoping report has recognised the need to assess the risks posed by the development to ground conditions and water resources including groundwater. This assessment will need to address both existing contamination that may be present and the impacts that the future ongoing operation of the facility will have on the groundwater environment. In order to demonstrate that the groundwater risks have been understood and appropriately addressed we recommend that the applicant provide a life-cycle feasibility assessment of the fuel storage and handling options for the location, taking account of its hydrogeological context. This should include consideration of: - Fuel distribution and dispensing system designs; - Location and construction of proposed and/or existing fuel tanks; - Surface drainage and connections and spill retention; - Associated control and monitoring systems.	It is noted that a permit may be required and the EA preference to avoid culverting of watercourses. See Appendix 3.3 Water Framework Directive Screening assessment and Appendix 5.2. The EA requirement for a life-cycle feasibility assessment of the fuel storage and handling options is to be considered at the detailed design and planning application stage.

Consultee	Abridged Comments	Comments
Natural England	The development site triggers the Impact Risk Zone (water supply) for both Holcroft Moss and Risley Moss SSSI's. Both sites are also designated at international level as Manchester Mosses Special Areas of Conservation. Large non-residential developments can have an impact on water supply mechanisms to designated sites, therefore the Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within this site and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.	The CSHM in Section 6 considers the potential for a pathway with the Manchester Mosses.
Public Protection – Warrington Borough Council	A preliminary risk assessment has identified potential gas and groundwater issues associated with the onsite conditions, the peat present on site and the adjacent landfill site. It is considered likely that mitigation measures to protect the underlying aquifer would be required for any development on site.	Section 9 provides details of the water related proposed mitigation measures.

Table 3.2: Summary of Consultation Responses relating to Water Resources

4. Methodology and Approach

Receptors

4.1. The receptors considered in the assessment are identified in accordance with Table 4.1. When a receptor meets multiple criteria or there is an absence of verified published data, the highest applicable sensitivity category is assigned to allow an assessment of the worst-case scenario.

Designation	Receptors
International	Internationally designated sites where hydrology/hydrogeology is a key factor in designation (e.g. Ramsar / Special Areas of Concern / Special Protection Areas sites)
National	Nationally designated sites where hydrology/hydrogeology is a key factor in designation (e.g. Sites of Special Scientific Interest, National Nature Reserves)
Regional	Akin to very large surface water or groundwater catchments.
County	Akin to large surface water or groundwater catchments. Typically includes public water supplies, groundwater Source Protection Zones, reservoirs, private water supplies (>1000m³/day water abstraction).
Borough / District	Akin to medium sized surface water or groundwater catchment and sub-catchments. Typically includes main river and private water supplies (between 100 and 1000m³/day water abstraction).
Local / Neighbourhood	Akin to small surface water or groundwater catchment and sub-catchments. Typically includes private water supplies (<100m³/day water abstraction), ordinary watercourse, land drains and ditches, small lakes and ponds.

Table 4.1: Receptors

Environmental Impacts

4.2. The scale of impact is determined in relation to the magnitude of change from the baseline condition that may result from the Proposed Development. Substantial, moderate and minor impacts can be beneficial or adverse. Negligible and neutral impacts are neither beneficial or adverse. Impacts found to be substantial or moderate are considered to have a significant effect; whereas impacts that are identified as minor, negligible and neutral are not considered to have a significant effect.

Magnitude	Environmental Impact
Substantial	Total loss / gain of, or alteration to, the baseline resource such that post- development characteristics or quality would be fundamentally and irreversibly changed.
High	Loss / gain of or alteration to the baseline resource such that post-development characteristics or quality would be fundamentally but reversibly changed.
Moderate	Loss / gain of or alteration to the baseline resource such that post-development characteristics or quality would be partially but reversibly changed.
Minor	Small changes to the baseline resource, which are detectable but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions.
Negligible	A very slight change to the baseline conditions, which is barely distinguishable.
Neutral	No change from the baseline environment.

Table 4.2: Environmental Impacts

Significance of Effects

4.3. The significance of effect is determined using the significance matrix in Section 6 of the Environmental Statement Part 1 Report. This identifies the receptor level across the top of the matrix and the magnitude of environmental impact down the side and where they meet within the matrix identifies the significance of the effect.

4.4. Effects that have been determined to be substantial, high or moderate are considered to have a significant effect and require specific mitigation in addition to good design and measures in a Construction Environment Management Plan (CEMP) or equivalent to address them. Effects that are identified as minor, negligible are not considered to have a significant effect and no further mitigation is required. Neutral effects do not require mitigation.

Impact Prediction Confidence

4.5. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out below:

Confidence Level	Description
High	The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels.

Table 4.3: Confidence Levels

5. Baseline Information

Rainfall

5.1. Average rainfall data has been obtained from the nearest Meteorological Office climate station to the Site at Woodford, which is approximately 25km southeast of the Site at National Grid Reference (NGR) SJ 89843 82578 for the standard period 1981-2010, as shown in Table 5.1. The UK Climate Projection (UKCP18) are available on the Met Office website[2] for the North West River Basin. Table 5.1 presents the percentage change in precipitation for the 90th percentiles for the four emission scenarios for winter and summer periods for the available time slices. UKCP18 predicates of the winter periods that the percentage change ranges from +10 to +40% (i.e. wetter), which for the summer period the range is from -10+ (i.e. drier) to +20% (i.e. wetter).

Month	Average Rainfall (mm)	Projective Change In Precipitation (%) for the North West River Basin for the Winter and Summer Periods									
		Time Slice: 2020 - 2039	Time Slice: 2040 - 2059					Time Slice: 2060 - 2079		Time Slice: 2080 - 2099	
		RCP2.6* RCP4.5* RCP6.0* RCP8.5*	RCP2.6*	RCP4.5*	RCP4.5*	RCP6.0*	RCP8.5*	RCP2.6* RCP4.5* RCP6.0*	RCP8.5*	RCP2.6*	RCP4.5* RCP6.0*	RCP8.5*
		Winter									
		+10 - +20%	+10 - +20%					+10 - +20%	+20 - +30%	+10 - +20%	+20 - +30%	+30 - +40%
		Summer									
		+10 - +20%	0 - +10%				-10 - 0%	0 - +10%	-10- 0%	0 - +10%	-10 - 0%	
		Average Rainfall (mm) With Projective Change In Precipitation									
		-10%	0%		+10%		+20%		+30%		+40%
Jan	81.5	73.4	81.5		89.7		97.8		106.0		114.1
Feb	51.5	46.4	51.5		56.7		61.8		67.0		72.1
Mar	58.6	52.7	58.6		64.5		70.3		76.2		82.0
Apr	61.4	55.3	61.4		67.5		73.7		79.8		86.0
May	54.8	49.3	54.8		60.3		65.8		71.2		76.7
Jun	64.5	58.1	64.5		71.0		77.4		83.9		90.3
Jul	67.3	60.6	67.3		74.0		80.8		87.5		94.2
Aug	79.4	71.5	79.4		87.3		95.3		103.2		111.2
Sep	79.6	71.6	79.6		87.6		95.5		103.5		111.4
Oct	98.8	88.9	98.8		108.7		118.6		128.4		138.3
Nov	79.9	71.9	79.9		87.9		95.9		103.9		111.9
Dec	89.8	80.8	89.8		98.8		107.8		116.7		125.7
Annual Total	867.1	780.4	867.1		953.8		1040.5		1127.2		1213.9

[2] Met Office (2019) Land Projections Maps: Probabilistic Projections [online]. Accessed 28/03/2019. Available at: https://www.metoffice.gov.uk/research/collaboration/ukcp/land-projection-maps

Month	Average Rainfall (mm)	Projective Change In Precipitation (%) for the North West River Basin for the Winter and Summer Periods									
		Time Slice: 2020 - 2039	Time Slice: 2040 - 2059					Time Slice: 2060 - 2079		Time Slice: 2080 - 2099	
		RCP2.6* RCP4.5* RCP6.0* RCP8.5*	RCP2.6*	RCP4.5*	RCP4.5*	RCP6.0*	RCP8.5*	RCP2.6* RCP4.5* RCP6.0*	RCP8.5*	RCP2.6*	RCP4.5* RCP6.0*	RCP8.5*
		Winter									
		+10 - +20%	+10 - +20%					+10 - +20%	+20 - +30%	+10 - +20%	+20 - +30%	+30 - +40%
		Summer									
		+10 - +20%	0 - +10%				-10 - 0%	0 - +10%	-10- 0%	0 - +10%	-10 - 0%	
		Average Rainfall (mm) With Projective Change In Precipitation									
		-10%	0%		+10%		+20%		+30%		+40%

Note

Average rainfall does not include provision for evaporation and evapotranspiration.

Emission Scenarios:

RCPs (Representative Concentration Pathways) are scenarios of future concentrations of greenhouse gases and other forcings.

RCP2.6 = 1.6°C (0.9-2.3°C) change in global temperature by 2081-2100

RCP4.5 = 2.4°C (1.7-3.2°C) change in global temperature by 2081-2100

RCP6.0 = 2.8°C (2.0-3.7°C) change in global temperature by 2081-2100

RCP8.5 = 4.3°C (3.2-5.4°C) change in global temperature by 2081-2100

* 90th Percentile selected -the three percentiles (10th 50th and 90th reflect the likelihood of those temperatures occurring under that emissions scenario

Table 5.1: Average Rainfall and Climate Change Projections

Topography

5.2. The topography of the Site falls from c.25m AOD in the southwest to c. 19m AOD in the northeast.

Surface Water Features

5.3. The eastern and northern boundaries of the Site are defined by relatively straight drains, which are likely to have been modified anthropogenically. The west of the Site comprises a drain, and Silver Lane Brook which is classified as a statutory main river[3]. Although the Site is relatively flat the predominant flow direction of the watercourses is towards the north. Other surface water features in the vicinity of the Site comprise an attenuation balancing pond and a series of drains associated with the restored (future country park) Risley Landfill Site to the west.

[3] Environment Agency (2019) Interactive Maps: Main River Consultation [online]. Accessed 15.03.2019. Available at: https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386

5.4. The Silver Lane Brook has a confluence with two unnamed watercourses at National Grid Reference (NGR) SJ 66765 94282 forming the Willow Brook. The first of these unnamed watercourses originates from an issue (spring) located near Bates Farm to the northwest of Site and flows east, via a series of drains, towards the confluence. The second unnamed watercourse originates from an issue near Bentham Road, to the north of the dismantled railway, and flows south towards the confluence. The Willow Brook flows eastwards, passing beneath Holcroft Lane (B5212), and discharges into the Glaze Brook at NGR SJ 68402 94072. The Glaze Brook then flows towards the southeast and joins the Manchester Ship Canal at NGR SJ 70232 91145.

5.5. The drain to the east of the Site is culverted at the southern boundary of the Site and appears to outfall to the M62 drainage system. A Site walkover undertaken in February 2019 found that there was no water within the drain along the eastern and northern boundary of the Site.

5.6. According to Sirius Environmental's March 2017 Hydrogeological Risk Assessment (HRA) Review prepared on behalf of Biffa Waste Services for the Risley Landfill Site "*a collection ditch runs along the edge of the southern boundary of the site, parallel to Silver Lane. The water collected in this ditch flows to the east in a collection pond.* […] *The pond has a sluice gate control prior to it feeding into the pond on the western side of the entrance road. This pond then overflows via a road culvert into the Silver Lane Brook. The sluice gate allows any contaminated water to be confined on site within the pond.*"

5.7. The main water source for the Silver Lane Brook appears to be from the Risley Landfill Site pond overflow culvert however, the brook is also likely to receive a small contribution from surrounding land along the western Site boundary.

5.8. The Silver Lane Brook was found to be heavily vegetated, with a recorded water depth ranging between approximately 0.1m and 0.25m. A concrete structure was found within the western ditch.

Surface Water Quality

5.9. The Site is within the Glaze Surface Water Sub-catchment[4] of the EA's Glaze Operation Catchment[5] This sub-catchment is monitored by the EA under the WFD as part of their North West River Basin Management Plan (RBMP). In 2016, the EA classified the Glaze surface water sub-catchment as having poor ecological status (due to barriers, sewage discharge, urbanisation and transport drainage), good chemical status and an overall poor status.

5.10. Surface water quality data is available for the River Glaze at Moss House Bridge (NGR SJ 67580 96063), located 2.2km northeast of the Site and 2.1km upstream of the confluence with Silver Lane Brook, and the River Glaze at Little Woolden Hall (NGR SJ 68513 93907), located 1.4km east of the Site and 0.2km downstream of the confluence with Silver Lane Brook.

5.11. Results from surface water quality monitoring undertaken between 2017 and 2019 were compared to The Water Supply (Water Quality) Regulations 2016, UK Drinking Water Standards (UKDWS), and the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. No exceedances of these standards were recorded at the River Glaze at Moss House Bridge. Exceedances of the UKDWS National Requirements were recorded for Iron in 50% of the samples analysed from the River Glaze at Little Woolden Hall.

Designations

5.12. The Site is not located in a Drinking Water Areas (surface water),[11] nor Drinking Water Safeguard Zone (surface water or groundwater).[11] The Site is located in a groundwater Source Protection Zone 3 (SPZ 3):[11] Total Catchment,[6] as shown in Figure 3.1, and a surface water (River Glaze) Nitrate Vulnerable Zone (NVZ).[11]

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[4] Environment Agency (209) Catchment Data Explorer: Glaze [online]. Accessed 15.03.2019. Available at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB112069061420

[5] Environment Agency (2019) Catchment Data Explorer: Glaze Operational Catchment [online]. Accessed15.03.2019. Available at: https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3202

[6] This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

Geology

5.13. The Site is located on 'raised bog peat soils'[7], with the land cover classified as arable and horticulture. According to British Geological Survey (BGS) mapping, there is no Made Ground present on Site.

5.14. According to BGS mapping[8], the majority of the Site is underlain by Peat superficial deposits, comprised of organic rich clay and humic deposits, over glacial Till, with the northern and western sections of the Site underlain by glacial Till only. Glacial Till deposits are located to the north, east, and west of the Site, with the area to the South of the Site comprised of Peat superficial deposits. Alluvium, comprised of silt, sand, peat, and gravel, is associated with Glaze Brook, to the east of the Site.

5.15. Preliminary Site Investigations (SI) were undertaken at the Site in August 2018 and consisted of 16 trial pits, See Appendix 7.2 for further details. The SI identified that topsoil was found at circa 0.3m depth and varied geographically becoming peat and clay based with underlaying strata. Peat deposits were encountered, with thickness increasing towards the southeast of the Site. A detailed soil survey undertaken in January 2019 confirmed that Peat deposits were present across the entirety of the Site. Sand and firm sandy clay were encountered below the Peat during investigation by auger, which is anticipated to be the top of the Till deposits. The northern site area was dominated by cohesive deposits comprising sandy clay with a minor component of fine to coarse gravel with a generally rounded angularity.

5.16. The bedrock geology consists of pebbly (gravelly) Helsby Sandstone Formation[8] described as "*fine to medium grained, locally micaceous, cross bedded and flat bedded sandstones, weathering to sand near surface*". The area surrounding the Site primarily consist of the Helsby Sandstone formation to the east and west, the Wilmslow Sandstone Formation to the north and the Tarporley Siltstone Formation to the south.

[7] UKSO (2019) Soils map viewer [online]. Accessed 12.04.2019. Available at: http://mapapps2.bgs.ac.uk/ukso/home.html

[8] British Geological Survey (2019) Geology of Britain Viewer [online]. Accessed 15.03.2019. Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Hydrogeology

5.17. A review of the BGS online hydrogeology map[9] indicates that the Helsby Sandstone Formation and the Wilmslow Sandstone Formation are both classified as highly productive bedrock aquifer[10]. The Helsby Sandstone Formation and the Wilmslow Sandstone Formation are both classified as Principal Bedrock Aquifers[11], which are defined as: "*geology that exhibit high permeability and/or provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale*"[12].

5.18. The Alluvium is classified as a Secondary A Superficial Aquifer, defined as: "*permeable layers capable of supporting water supplies at local rather than strategic scale, and in some cases forming an important source of base flow to river*"[11,13].

5.19. The Tarporley Siltstone is classified as a Secondary B Aquifer, defined as: "*predominantly lower permeability strata which may in part have the ability to store and yield limited amounts of groundwater by virtue of localised features such as fissures, thin permeable horizons, and weathering*"[12].

5.20. The glacial Till is classified as a Secondary (Undifferentiated) Aquifer, defined as: "*in cases where is has not been possible to attribute either category A or B to a rock type*". The Peat is defined as Unproductive Strata: "*geological strata with low permeability that have negligible significance for water supply or river base flow*"[13].

5.21. Table 5.2 provides a summary of the groundwater elevations taken from Sirius Environmental's HRA Assessment for the two Risley Landfill Site boreholes that are within the Site boundary. Sirius Environmental found that groundwater levels increased between 2008 and 2016 but the results were consistent with previous HRAs undertaken at the landfill. Sirius Environmental also commented that "*the inferred direction of groundwater flow below Risley*

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[9] British Geological Survey (2019) Onshore GeoIndex: Hydrogeology 1:625,00 Scale [online]. Accessed 15.03.2019. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html

[10] Principal sandstone aquifer up to 600m thick and yielding up to 125l/s. Quality good but hard and becomes saline beneath confining Mercia Mudstone.

[11] MAGIC Partnership (2019) MAGIC Interactive Map [online]. Accessed 15.03.2019. Available at: http://www.magic.gov.uk/MagicMap.aspx

[12] Environment Agency (2019) Aquifer Designation Map (Bedrock Geology) [online]. Accessed 12.04.2019. Available at: https://data.gov.uk/dataset/ca82ec72-caf6-43c2-a70d-14c173c1e48f/aquifer-designation-map-bedrock-geology

[13] Environment Agency (2019) Aquifer Designation Map (Superficial Deposits) [online]. Accessed 12.04.2019. Available at: https://data.gov.uk/dataset/ef2399f1-acf4-45a7-abf3-c7369c0c8640/aquifer-designation-map-superficial-deposits

Landfill Site is from the northeast towards the southwest. This is concurrent with the discussion presented in the 2008 HRAR."

Borehole ID	Groundwater Elevations (m AOD)			Range (m)
	Min	Mean	Max	
R420	16.53	17.56	18.50	1.97
R421	15.58	16.55	17.35	1.77

Table 5.2: Risley Landfill Site Monitored Groundwater Elevation (2008-2016) For Boreholes Onsite

5.22. Sirius Environmental also stated that "*the groundwater in the vicinity of the* [Risley Landfill] *site flows in a south westerly/westerly direction and as the Glaze Brook is situated to the east/north east of the site, it is unlikely that groundwater provides a base flow to this surface water feature*." In addition, Sirius Environmental considered that surface water ponds within the northern extents of the Risley Landfill Site as well as the surface water ditches/flows across the capped landfill are above the levels of the groundwater head and therefore not in hydraulic continuity with the groundwater.

5.23. The EA have three groundwater monitoring boreholes within proximity of the Site. Monitoring station SJ69_39 Taylors Industrial Estate is located c.0.94km north west of the Site (NGR SJ 06604 09440). Data for this monitoring station is available seasonally from 2009 – 2018; the average groundwater elevation for this time period is 17.66m AOD, with the most recent measurement of 18.82m AOD taken in September 2018. Monitoring station SJ69_130 Fowley Common is located c.2.2km north of the Site (NGR SJ 00692 09620). Data for this monitoring station is available seasonally from 2009 – 2018; the average groundwater elevation for this time period is 15.72m AOD, with the most recent measurement of 15.6m AOD taken in September 2018. Monitoring station SJ69_129C Croft PS is located c.2.5km northwest of the Site (NGR 06440 09455). Data for this monitoring station is available in a range of timesteps between 2009 – 2019. The average groundwater elevation for this time period is 12.27m AOD, with the most recent measurement of 16.25m AOD taken in January 2019, and an elevation of 14.8m AOD in September 2018. Groundwater contour maps provided by the EA suggest a regional groundwater flow direction from east to northwest.

5.24. There is one publicly available BGS borehole log within the Site (Borehole SJ69SE7[14]), this borehole was drilled to 15.2m and encountered water at 7.0m Below Ground Level (m BGL) or approximately 13m AOD in the dark brown sandy Clay and stones.

5.25. There are a number of BGS boreholes offsite, however three boreholes are representative of hydrogeological conditions between the Site and Holcroft Moss SSSI:

- Borehole SJ69SE56[15] located approximately 50m southwest of the Site was drilled to 13.3m and first encountered water at 10.8m BGL or approximately 12.7m AOD, which then rose to a rest level of 7.3m BGL or 16.0m AOD both within the stiff brown sand stony Clay.
- Borehole SJ69SE70[16] located approximately 380m southwest of the Site was drilled to 15.2m and first encountered water at 10.9m BGL or approximately 9.8m AOD, which then rose to a rest level of 6.1m BGL or 14.6m AOD both within the firm brown sandy Clay.
- Borehole SJ69SE76[17] located approximately 1,300m southwest of the Site was drilled to 7.3m and first encountered water e at 3.9m BGL or approximately 14.4m AOD, which then rose to a rest level of 3.8m BGL or 14.6m AOD both within the Soft brown and grey slightly Clayey / silty Sand.

5.26. These boreholes suggest the bedrock groundwater beneath the Site is confined by the Glacial Till.

5.27. The only groundwater that was encountered during the Preliminary SI 2018 was in TP104 (NGR SJ 67115 93559) at 2.7m BGL within the very sandy and gravelly Clay deposits and is therefore likely to be perched water.

5.28. The Site is located within the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers groundwater sub-catchment,[18] which is monitored by the EA under the WFD to inform the WFD classification summarised in their North West RBMP. In 2016, the EA classified this groundwater sub-catchment as having poor quantitative, poor chemical and an overall poor status. The EA have reported that the groundwater body is failing to achieve

[14] British Geological Survey (2019) Borehole SJ69SE7 [online]. Accessed 17/04/2019. Available at: http://scans.bgs.ac.uk/sobi_scans/boreholes/895371/images/12256308.html
[15] British Geological Survey (2019) Borehole SJ69SE56 [online]. Accessed 17/04/2019. Available at: http://scans.bgs.ac.uk/sobi_scans/boreholes/895422/images/12256431.html
[16] British Geological Survey (2019) Borehole SJ69SE70 [online]. Accessed 17/04/2019. Available at: http://scans.bgs.ac.uk/sobi_scans/boreholes/895436/images/12256447.html
[17] British Geological Survey (2019) Borehole SJ69SE76 [online]. Accessed 17/04/2019. Available at: http://scans.bgs.ac.uk/sobi_scans/boreholes/895442/images/12256455.html
[18] Environment Agency (2019) Catchment Data Explorer: Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers [online]. Accessed 15.03.2019. Available at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB41201G101700

good status due to private sewage treatment, poor nutrient and phosphate management, and saline or other intrusion.

5.29. EA groundwater quality monitoring data was not available within 2km of the Site.

5.30. Sirius Environmental's HRA Assessment found the following in terms of water quality for the two onsite boreholes (R420 and R421):

- Ammoniacal nitrogen results for borehole R420, were frequently greater than 3mg/l. Due to the position of this borehole relative to the landfill site Sirius Environmental concluded that the increased ammoniacal nitrogen concentration profile was most likely as a result of an external source, which had previously been attributed to agricultural practices or the presence of peat deposits up-gradient of this monitoring installation.
- Chloride concentrations were below the Drinking Water Standard (DWS) (250mg/l) in boreholes R420 and R421.
- In line with the findings reported in the 2008 HRAR, electrical conductivity levels generally remained consistently below 1500uS/cm.
- Iron concentrations at R420 were recorded above the DWS between 2010 and 2016. Sirius Environmental reflected that in recent years, this borehole R420 had recorded the highest levels of Iron, suggested that this was due to background concentration of the metal within groundwater.
- Mecoprop, was consistently detected in borehole R420, with a maximum concentration of 0.58µg/l. This was also identified within the 2008 HRA, which, given the borehole's position, was attributed to the application of mecoprop in commonly used agricultural herbicide up gradient of the Site.
- A single recording of discernible concentrations of Bis (2-ethylhexyl) phthalate was recorded at borehole R421.

5.31. Groundwater quality monitoring data was supplied by Biffa for two monitoring locations within the Site boundary; R420 (NGR SJ 66885 93866), and R421 (NGR SJ 66923 93349). These boreholes were installed as part of the Risley Landfill Site permit requirements. Results from groundwater quality monitoring undertaken between 2013 and 2016 were compared to The Water Supply (Water Quality) Regulations 2016, UK Drinking Water Standards (UKDWS), and the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (EQS).

5.32. At R420, exceedances in the UKDWS were identified for Manganese and Nickel in 2011 and 2012, however monitoring results were not available for these parameters beyond 2012. One exceedance in the UKDWS of Lead was identified in 2011, however subsequent monitoring results recorded that levels were below the limit of detection and monitoring of this parameter ceased in 2012. Iron was found to exceed the UKDWS on multiple occasions throughout the monitoring period.

5.33. At R421, Cyanide was found to have exceeded the EQS Short Term MAC on one occasion, in 2016, with all other samples found to be below the limit of detection. Lead was found to have exceeded the UKDWS Directive Requirements on one occasion in 2011, all subsequent samples were found to be below the limit of detection. Manganese was found to exceed the UKDWS National Requirements during all monitoring rounds.

5.34. Both monitoring locations were also analysed for Polycyclic Aromatic Hydrocarbons (PAH) and Volatile Organic Compounds (VOC). No PAHs were found to be above the limit of detection for either monitoring location. In terms of VOCs, 4-Bromofluorobenzene and Dibromofluoromethane were reported, however there are no EQS or UKDWS values assigned to these determinands. o-Xylene was detected on one occasion within each sampling location; at 0.33µg/l on 07/07/2014 in R420 and at 0.11µg/l on 26/07/2012 in R421, however there is no value assigned to this determinand within the EQS or UKDWS. Toluene was detected during a number of sampling rounds within both monitoring locations, to a maximum of 0.36µg/l within R420 and a maximum of 0.38µg/l within R421, and therefore did not exceed the EQS Groundwater Maximum Threshold Value (38.2µg/l). No other VOCs were found to be above the limit of detection within either monitoring location.

Peat Hydrology

5.35. The Site is largely comprised of soils of the Turbary Moor association, described as being found on lowland raised bog peats, variously modified from their original condition by drainage, peat cutting and reclamation for agriculture.

5.36. A detailed soil survey was undertaken in January 2019 (see Agricultural Land and Soils Technical Paper 10), which confirmed the presence of peat topsoil across the Site, however highlighted the absence of an acrotelm (the active, peat forming, layer). Peat is formed when the presence of an impermeable underlying strata results in a water level at, or just under, the ground surface over a long term, resulting in retarded decay due to anaerobic conditions. Drainage of the Site has historically lowered the water table, by draining the peat around the circumference and drying it to use as agricultural land. This drainage has resulted in the absence of an acrotelm, however the current efficiency of the drains is questionable due to the wet surface ground conditions identified during the soil survey. The soil survey demonstrated an increased water content with depth. Although Peat is classified as

Unproductive Strata, and therefore not considered to be an aquifer, Peat can store and transmit water, and can be an important water resource locally.

Private Water Supplies, Abstractions and Discharges

5.37. A data request for details of Private Water Supplies (PrWS) within 3km of the Site was sent to Warrington Borough Council (WBC). WBC provided details of three PrWS (see Appendix 3.2) however none of these PrWS are located within 3km of the Site.

5.38. According to the EA there are two groundwater water abstraction licenses and four discharge consents within 2km of the Site (detailed in Table 5.2 and shown on Figure 3.1).

5.39. It should be noted that the EA records do not include any discharges from the Risley Landfill Site, however Sirius Environmental's HRA Assessment reported that the discharges were consolidated under the landfills' s PPC permit.

Consent Type	Consent Holder	Consent Description	National Grid Reference	Approximate Distance and Direction from The Site
Environment Agency Abstraction Data				
Water Abstraction: Groundwater 2569022005/R01	WBC Birchwood Park Trustee Limited - Permo Triassic Sherwood At Birchwood Park	Permit start date 24/08/2015. Make-up or top up water for spray irrigation from groundwater source.	SJ 65143 92306	1,880m southwest of the Site
Water Abstraction: Groundwater 2569022005/R01	WBC Birchwood Park Trustee Limited - Permo Triassic Sherwood At Birchwood Park	Permit start date 08/03/2016. Make-up or top up water for spray irrigation from groundwater source.	SJ 65143 92306	1,880m southwest of the Site.
Environment Agency Discharge Data				
Discharge Consent: Surface Water 0174/1	Christopher & Geoffrey Moss - Hoyles Moss Farm	Issue and effective date 06/05/1974. Private sewage discharges of final/treated effluent to tributary of River Glaze.	SJ 67500 92600	780m southeast of the Site

Consent Type	Consent Holder	Consent Description	National Grid Reference	Approximate Distance and Direction from The Site
Discharge Consent: Surface Water 16993444	Taylor Business Park Ltd	Issue and effective date 15/02/2002. Pumping station on unadopted sewerage network. Private sewage discharges of final/treated effluent to Holcroft Lane Brook. Limited to sewage in an emergency when the Pumping Station is inoperative.	SJ 65990 94510	1,057m northwest of the Site
Discharge Consent 01WAR0109	United Utilities Water Ltd	Effective date 01/01/1995. Storm Tank/CSO on Sewerage Network (Water Company). Receiving water unknown.	SJ 66080 95240	1,550m northwest of the Site
Discharge Consent: Surface Water 16920350	United Utilities Water Ltd	Glazebury sewage treatment works. Date issued 16/02/2010, date effective 01/09/2013. Receiving water is the River Glaze.	SJ 67800 95520	1,800m northeast

Table 5.3: Abstractions and Discharges

Flood Risk

5.40. From an initial inspection of the Government's Flood Map for Planning[19] and Long Term Flood Risk online map[20], this shows the Site to be within Flood Zone 1 (i.e. low probability of fluvial flooding), as defined in the NPPF 18. The Site is also shown not to be significantly affected by surface water and not to be affected by reservoir flood risk. Groundwater flood risk is

[19] UK Government (2019) Flood Map for Planning [online]. Accessed 15.03.2019. Available at: https://flood-map-for-planning.service.gov.uk/confirm-location?easting=367034&northing=393585&nationalGridReference=SJ6703493585

[20] UK Government (2019) Long Term Flood Risk Information [online]. Accessed 15.03.2019. Available at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

considered limited due to the existing drainage provision over the area, see Appendix 3.1 - for further details.

Hydro-ecological Designated Sites

5.41. Hydro-ecological designated areas include internationally, nationally and locally designated ecological areas where hydrology or hydrogeology is a key factor in their designation. Designation areas include, but are not limited to, Ramsar sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Sites of Nature Conservation Interest (SNCI) and Local Nature Reserves (LNR).

5.42. According to Defra's MAGIC website[11] there are three hydro-ecological designated sites, within 2km of the Site, two Sites of Special Scientific Interest (SSSI) and one Special Areas of Conservation (SAC):

- Holcroft Moss SSSI, approximately 890m east of the Site. Designated for its mossland;[21]
- Risley Moss, SSSI, approximately 840m south of the Site. Designated for its raised bog system;[22]
- Manchester Mosses SAC, designated for its raised bog system[23], and comprising both Holcroft Moss and Risley Moss as well as Astley & Bedford Mosses SSSI.

5.43. There are no other statutory designated sites such as Ramsar sites or Special Protection Areas (SPA) within 2km of the Site.

Potential Contaminated Sources

5.44. The EA have advised that there are three authorised landfills within 2km of the Site. Information regarding these is displayed within Table 5.4:.

[21] Natural England (2019) Holcroft Moss SSSI [online]. Accessed 15.03.2019. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1006461.pdf
[22] Natural England (2019) Risley Moss SSSI [online]. Accessed 15.03.2019. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1001838.pdf
[23] Joint Nature Conservation Committee (2019) Manchester Mosses [online]. Accessed 15.03.2019. Available at: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?eucode=UK0030200

Licence no.	Licence Name	NGR	Distance from Site (m)	Type	Status
EP3938AJ	Rixton Landfill	SJ 67940 91662	c.1,600m southeast	>10T/D with capacity >25,000T excluding inert waste	Effective
MP3530QJ	Risley Landfill	SJ 66500 93500	0m (adjacent to western Site boundary)	>10T/D with capacity >25,000T excluding inert waste	Effective
EA/EPR/KP3496 CJ/V002	Holcroft Hall Quarry Landfill Site	SJ 67890 95280	c.1,400m northeast	A06: Landfill taking other wastes	Closure

Table 5.4: Authorised Landfills within 2km

5.45. There are seven historic landfills within 2km of the Site. Information regarding these is displayed within Table 5.5.

Landfill Name	NGR	Distance from Site (m)	General Information
Wimpey Silver Lane	SJ 65500 93900	c.800m west	Accepted inert, industrial, special waste and liquid sludge between 30/04/1975 and 31/01/1984. Construction wastes and mine and quarry waste to the maximum of 2500 Tonnes per day, and inert and non-flammable non-hazardous industrial wastes to a maximum of 10 tonnes a day (occasionally).
Wimpey Silver Lane	SJ 65800 93400	c.840m west	Accepted inert, industrial, special waste and liquid sludge between 30/04/1975 and 31/01/1984. Construction, mine and quarry, non-flammable, non-hazardous industrial wastes.
Silver Lane No. 2 Site	SJ 65800 93400	c.840m west	Accepted inert waste between 30/06/1979 and 31/03/1981.
Risley Landfill	SJ 65800 93400	c.840m west	No information on waste types or dates of closure are available.
Warrington Road	SJ 65600 93500	c.800m west	Accepted inert, industrial, commercial, household, special, liquid sludge and gas control wastes between 31/03/1982 and 31/12/1992. Construction, mine and quarry wastes and inert and non-flammable non-hazardous industrial wastes.
Pendulum Field	SJ 65900 93300	c.830m west	Accepted inert, industrial, commercial, household, special, and gas control wastes between 31/05/1980 and 31/05/1980. Domestic, commercial, non-hazardous industrial waste and Construction industry waste.
Glaze Brook	SJ 68700 93700	c.1400m east	No information on waste types or dates of operation in available.

Table 5.5: Historic Landfills within 2km

5.46. According to the EA data request there have been 128 closed pollution incidents within 2km of the Site. Example types of pollution include contaminated water, oils and fuel, atmospheric pollutants and effects and sewage materials.

Likely Evolution of the Baseline

5.47. It is anticipated that without the Proposed Development the identified baseline scenario for water resources within the Site would not change significantly in the short term as a result of natural processes and systems. However, the baseline does have the potential to alter due to climate change. An increase in rainfall may affect run-off across the Site and could alter watercourse processes such as erosion, deposition and the frequency and intensity of river flooding. A decrease in rainfall could lead to seasonal and prolonged drying out of watercourses and drains, which may affect aquatic ecology. In addition, a reduction in rainfall may also affect groundwater recharge time and decrease groundwater elevations.

6. Conceptual Site Hydrogeological Model

6.1. The Conceptual Site Hydrogeological Model (CSHM), as detailed in the following bullet points, has been created based on the source-pathway-receptor linkages for the current baseline and for the construction and operation phases of the Proposed Development and is used to identify potential impacts and at-risk receptors.

6.2. A full description of the Proposed Development and development parameters for assessment are included in the introductory chapters to the ES Part 1 Report. The following bullet points summarise the key water related elements of the Proposed Development:

- Diversion of the Silver Lane Brook.
- Surface water drainage and SuDS features, with pumped discharge to the diverted Silver Lane Brook.
- Watercourse crossing of diverted Silver Lane Brook to allow access to the gas main and land to the east.
- Use of Peat in habitat creation onsite.
- Fuel Filling Station including underground storage of fuel, isolated drainage with petrol interceptors.
- Parking areas and associated drainage including petrol interceptors.
- Possible dewatering of excavations.
- The Proposed Development would be connected to mains water and the sewage network.

Sources

Baseline

6.3. Water sources comprise:

- S1: Precipitation (predominantly rain and snow melt) and subsequent runoff.
- S2: Perched water in Peat and Till deposits and interflow of water through the peat.
- S3: The Silver Lane Brook and catchment including onsite drains.
- S4: Groundwater stored and transmitted in Helsby Sandstone Formation bedrock.

6.4. Baseline contamination and anthropogenic alteration to the water environment sources could include:

- S6: Leaching of nutrients associated with agricultural land use.
- S7: Releases of sediment laden runoff from the track / footpath to the west of the Site during periods of rainfall.
- S8: Releases of sediment laden runoff from field underdrainage.
- S9: Leaching of nutrients from peat during rainfall.

- S10: Culvert crossing of the Silver Lane Brook.
- S11: Discharge of surface water from Risley Landfill Site ponds.
- S12: Runoff from the M62 potentially including de-icing substances, fuels and oils.
- S13: Culvert under the M62 in southeast of the Site is thought to drain this area of the Site into the M62 road drainage.

Construction and Operational Phases

6.5. During construction and operational phases of the Proposed Development the majority of the baseline water sources would still occur however the following sources would not be present:

- S6: Leaching of nutrients associated with agricultural land use.
- S8: Releases of sediment laden runoff from field underdrainage, as field underdrainage would be dug out as part of the Proposed Development.
- S9: Release of sediment from diverted public footpath.
- S10: Subsurface seepages (alkaline leachate) into the groundwater from cement and concrete.

6.6. In addition to the sources identified during the baseline the following source (alteration to the water environment) are applicable to construction and operational phases of the Proposed Development:

- S13: Oil, lubricants and fuel from accidental releases from plant and machinery and onsite storage.
- S14: Releases of suspended sediment from disturbance of peat.
- S15: Sediments may be released during construction and operation of roads.
- S16: Sediments may be released by earthworks during construction.
- S17: Concrete and cement leachate.
- S18: Sliver Lane Brook river diversion and watercourse crossing causes changes in hydromorphology of the Site and releases of sediment.
- S19: Surface water intercepted by onsite drainage redirecting groundwater recharge locations.
- S20: Release of de-icing substance from roads, walkways and parking areas.
- S21: Gas pipeline – retaining wall in peat

Pathways

Baseline

6.7. The following water pathways have been identified from the baseline study:

- P1: Runoff (above surface flow) flows across the Site from areas from high to low elevations in accordance with topography.
- P2: Surface water in the Silver Lane Brook and associated drains.
- P3: Infiltration of precipitation into the peat, as well as some degree of direct infiltration, into the superficial deposits (Till) where peat deposits are not present.

- P4: Throughflow in the peat and also very limited and locally in permeable horizons of the glacial Till deposits. The potentially high clay content of the glacial Till may impede the vertical movement of water leading to peat saturation and the promotion of surface runoff during wet periods. The peat is likely to be perched on the low permeability Till.
- P6: Very limited percolation from the peat and glacial Till deposits into the Helsby Sandstone Formation bedrock. Till is thought to confine the Helsby Sandstone Formation aquifer.
- P7: Groundwater flow (northeast to southwest) through in the Helsby Sandstone Formation bedrock.
- P8: Runoff from track / footpath to the west of the Site during periods of rainfall transporting sediment laden water.

Construction and Operational Phases

6.8. The following pathways have been identified as potential routes for water to reach receptors or describe how the movement of water may changes as a result of the operational Proposed Development:

- P9: Runoff (above surface flow) flows from areas of hardstanding and roads at the Site.
- P10: Dewatering of groundwater from excavations may cause groundwater to be drawn into excavations.
- P11: Discharge of sediment laden water dewatered from excavations to ground and / or surface water.
- P12: Discharge from the SuDS features to diverted Silver Lane Brook.
- P13: Removal of onsite Peat causing loss of local hydraulic connection of the remaining peat.

Receptors

6.9. Table 6.1 presents the receptors that have been identified from the baseline study as well as those receptors that have been determine from the CSHM to the 'at risk' of the Proposed Development. Table 6.1 also includes the receptors that were determined from the CSHM not to be 'at risk' of the Proposed Development. Receptor sensitivity has been determined from Table 4.1.

Receptor		Distance from the Site	Receptor Characteristics	Receptor Sensitivity	Is the Receptor at Risk?
R1	Silver Lane Brook and onsite drains	Within the Site	Main River	Borough	Yes
R2	Two unnamed tributaries of the Willow Brook (Upstream of confluence with Silver Lane Brook)	Confluence is approximately 390m north of the Site	Main River	Borough	No – These watercourses are upstream of the confluence with Silver Lane Brook
R3	Willow Brook	Receives water from the Silver Lane Brook	Main River	Borough	Yes
R4	Glaze Brook	Receives water from the Silver Lane Brook	Main River Nitrate Vulnerable Zone (NVZ)	County	Yes
R5	Perched water within the Peat	Underlies the Site (*in situ* peat immediately adjacent to the removed peat onsite and to the east of the Site adjacent to the gas main)	Peat Unproductive Strata Absence of acrotelm layer (the active peat forming layer) Underdrainage present	Local	Yes
R6	Perched water within the Till	Underlies the Site	Secondary (Undifferentiated) Aquifer	Local	Yes
R7	Groundwater in the Helsby Sandstone Formation bedrock	Underlies the Site	Highly productive aquifer Groundwater Source Protection Zone (SPZ) 3 Principal Aquifer Confined by the overlying Till	County	Yes

Receptor		Distance from the Site	Receptor Characteristics	Receptor Sensitivity	Is the Receptor at Risk?
R9	Two Groundwater Abstraction (2569022005/R01)	Approximately 1,880m southwest of the Site	Make-up or top up water for spray irrigation	Neighbourhood	No – Due to the separation distance between these abstractions and the Site.
R10	Holcroft Moss, SSSI	Approximately 890m east of the Site	Designated for its mossland	International	No - these is no hydrological or hydrogeological connection.
R11	Risley Moss SSSI	Approximately 840m south of the Site	Designated for its raised bog system	International	No - these is no hydrological or hydrogeological connection.
R12	Manchester Mosses SAC*	Approximately 890m east and 1,075m south of the Site	Designated for its raised bog system	International	No - these is no hydrological connection.

Note

The water resources receptors that are not at risk from the Proposed Development have been scoped out of the assessment and are not considered further.

* It is noted that the Manchester Mosses SAC includes other sites, which are over 2km from the Site, however these have not been identified by Natural England to require assessment in relation to the Site.

Table 6.1: Summary of Receptors

6.10. Manchester Mosses SAC including; Holcroft Moss, SAC and SSSI and Risley Moss, SAC and SSSI are not considered to be 'at risk' of the Proposed Development as it has been determined that there are no water pathways between the SAC and the Site, this is based on a number of reasons:

- The Risley Moss is mainly located on the Bollin Mudstone Member (Mudstone), but the northern areas of this Moss are located on the Tarporley Siltstone Formation (Siltstone, Mudstone and Sandston). These Formation overlie the Helsby Sandstone Formation (Sandstone, Pebbly (gravelly), as the Helsby Sandstone Formation is dipping to the south-west. There is unlikely to be hydraulic continuity between the Helsby Sandstone and the overlying lower permeability mudstones / siltstones. Groundwater flow within the sandstone is also recorded to be towards the west / south-west whereas Risley Moss is located to the south of the Site.

- Holcroft Moss and the Site are both located on the Helsby Sandstone Formation (Sandstone, Pebbly (gravelly)). However, as Sirius Environmental's HAR Review found that "*the* [Helsby Sandstone Formation] groundwater *in the vicinity of the* [Risley Landfill] *site flows in a south westerly/westerly direction*." Holcroft Moss is located to the east the Site. Therefore, this Moss is located across hydraulic gradient from the Site.
- BGS borehole records from BGS GeoRecords Plus+[24] suggest that the groundwater in the Helsby Sandstone Formation is confined). Groundwater strikes are recorded at the upper surface of the Sandstone, but rest water levels are recorded as being coincident with the overlying superficial deposits even when these are cased out within the borehole. This is also seen where Peat has been excavated and is limited in thickness within the borehole logs.
- As the M62 is at the similar elevation as the Site it is likely that excavation for the motorway foundations would have cut through the Peat, and possibly into the underlying superficial deposits, removing any hydrogeologic connection via the Peat between the Site and Holcroft Moss.

[24] British Geological Survey (2019) GeoRecords Plus+ [online]. Accessed 17/04/2019. Available at: http://mapapps.bgs.ac.uk/GeoRecords/GeoRecords.html

7. Alternatives Considered

River Diversion

7.1. To facilitate the development while ensuring required environmental and sustainable opportunities for the Site were achieved, consideration of how the development fitted into the Site constraints was undertaken.

7.2. Due to a National Grid high pressure gas main running along the eastern boundary, creating a development exclusion zone, the Silver Lane Brook meandering into the northwestern part of the Site and the aim of minimising removal of the southeastern peat area, the available area for development was significantly constrained.

7.3. To allow the development to fit around these constraints, a number of options were considered and these included looking at diverting the gas main away from the development, culverting the brook to the western boundary and diverting the brook to the eastern side of the Site.

7.4. The diversion of the gas main was discounted due to limited land available to move the gas main to and the extensive work that would be required to move a high pressure gas main.

7.5. Culverting of the brook was investigated but considered to have a negative effect on ecology and biodiversity due to direct loss of aquatic and marginal habitats and the potential to increase flood risk upstream by constraining flows.

7.6. Treatment and removal of the extensive area of peat to the southeastern end of the Site was investigated but discounted from a sustainable and environmental perspective benefit (see Technical Paper 10 Agricultural Land and Soils).

7.7. On the basis that the gas main could not be feasibly moved, culverting of the brook was not favoured due to the adverse environmental effects and retaining of the peat to the southeastern end of the Site was preferred, the alternative option considered was to divert the brook through the Proposed Development.

7.8. Diversion of the brook to the east of the development was investigated and it was considered that it did allow the opportunity to retain an open flowing channel which could be designed to have a more variable channel profile than the existing brook, thereby allowing a greater

diversity of aquatic habitats and areas of dense marginal planting to be incorporated. The diversion also allowed the potential opportunity to vary the flow using riffles, areas of slow/static flow, gravel beds and deep peaty sediment to be included. These variations and enhancements were seen as a means of creating a wildlife corridor, linking habitats within a biodiverse landscape.

7.9. On the above basis the diversion of the brook was taken forward into the development layout design.

Discharge Options

7.10. As detailed in Appendix 3.1 Flood Risk and Drainage Strategy, the Site drains, via infiltration and surface flow, to the Silver Lane Brook to the west and an unnamed watercourse to the east, which also connects to the brook. Flows from the Site are unrestricted and drain freely into the surrounding water environment.

7.11. A review of the drainage discharge options to serve the Proposed Development was completed.

7.12. The use of an infiltration discharge was discounted due to groundwater protection requirements and the ground conditions not being considered suitable for a reliable long-term infiltration capacity.

7.13. There were no surface water sewers in the area and therefore, this option of discharge was also discounted.

7.14. As the Site naturally drains to the two watercourses, to the east and west boundaries, it was considered that a surface water discharge to these would be feasible. Following discussions with Warrington Borough Council as Lead Local Flood Authority, it was agreed that the surface water runoff from the Proposed Development could be discharged at greenfield runoff rate, Q_{bar}, to the diverted Silver Lane Brook.

7.15. The general fall of the Site is from south to north and the brook is relatively flat and very shallow in depth.

7.16. An initial gravity discharge design of the surface water drainage system to serve the Development Proposals identified that the Site would require significant raising to allow the

drainage to function with sufficient pipe cover. On this basis an alternative option of pumping the surface water drainage to the brook was considered. By using a pumped discharge, it was identified that the Site could be significantly lowered thereby significantly reducing the Site raising requirements. The pumped discharge option was still based on discharging at greenfield, Q_{bar}, runoff rate and providing the same level of surface water storage as required by the gravity discharge option.

7.17. The comparison of the two options identified that the pumped discharge option provided significant environmental benefits in terms of reducing material import and earthworks requirements compared to the gravity option. On this basis, the pumped surface water discharge option was selected as the preferred option. This discharge would be to the diverted Silver Lane Brook.

Drainage Design Evolution

7.18. As detailed above and within Appendix 3.1 Flood Risk and Drainage Strategy, the Proposed Development's surface water drainage design aims to mimic and reduce this existing runoff characteristic by restricting discharge to the existing greenfield runoff rate, Q_{bar}, for all storm events up to and including the 1 in 100 year storm event with a 20% climate change allowance. To mitigate for storm events that are above the greenfield runoff rate, surface water storage is provided in the development proposals.

7.19. Initial drainage designs looked at providing the surface water storage in the form of a dry basin to the northeast end of the Proposed Development. However, to allow the environmental and sustainable approach of retaining the peat to the southeast, this area of land was now required to be used as part of the parking area to serve the Development Proposals. To compensate for the loss of the dry basin, it was agreed that the surface water storage requirements would be provided using a mix of tank/crate storage, smaller discrete dry basins and swales.

7.20. Within the proposed surface water drainage design, water treatment is being provided. This would consist of using a mix of swales, channel drainage (rills), gullies, filter drains/catchpits and discrete dry basins as well as using Class 1 petrol interceptors. These would ensure water quality to the brook is maintained to a high level. To ensure groundwater protection,

consideration of lining/sealing of the drainage systems to minimise infiltration where required would be given.

7.21. Appropriate management and maintenance of the surface water drainage systems will be undertaken to ensure that the drainage systems operate and mitigate on and off site flood risk and water quality requirements satisfactorily and in accordance with UK Legislation.

8. Potential Environmental Effects

Construction Phase

8.1. Construction effects can be categorised into two types: i) those that relate to the act of carrying out construction (e.g. earthworks causing sedimentation of watercourses); and ii) those that relate to the construction of the development itself (e.g. the creation impermeable surfaces, such as roads and buildings, within the catchment).

8.2. Table 8.1 details the potential effects that may arise from the activities of the Proposed Development during construction.

Proposed Development Component / Activity	Potential effects	At Risk Receptor	
Earthworks including excavations	Excavation and sequential removal of the topsoil and superficial deposits has the potential to reduce the pathway to the underlying groundwater (perched in peat and Till) and finally the bedrock aquifer therefore increasing the vulnerability of the groundwater to potential contamination/oil spills during construction.	Local	Perched water within the Peat Perched water within the Till
		Borough	None
		County	Groundwater in the Helsby Sandstone Formation bedrock
	Mobilisation of sediment, which could enter watercourse and waterbodies causing increased erosion altering deposition. This may also result in harm to aquatic flora and fauna.	Local	None
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
Dewatering of excavations	Release of sediment and silt laden water from the discharge of water removed from excavations to watercourse and / or ground, which could cause a degradation in water quality.	Local	None
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
	Pumping of groundwater may cause a localised drawdown of the watertable and cause water in the surrounding area to be drawn into the excavations. May cause offsite contaminated groundwater to be draw into the Site	Local	Perched water within the Peat Perched water within the Till
		Borough	None
		County	Groundwater in the Helsby Sandstone Formation bedrock
Use of machinery and storage of chemicals onsite	Accidental spills or leakage of fuel and oil from machinery and storage onsite during the construction phase could affect the underlying groundwater and enter surface water watercourses and waterbodies and lead to a degradation of water quality.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook Groundwater in the Helsby Sandstone Formation bedrock

Proposed Development Component / Activity	Potential effects	At Risk Receptor	
Soil stripping and vegetation removal	Soil stripping reduces soil moisture storage capacity and may increases runoff and may lead to flooding.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
Soil compaction	Compaction due to use of heavy machinery reduces infiltration, increases runoff and shortens the rainfall–runoff response and may lead to flooding.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
Construction of impermeable surfaces such as roads / pavements	Reduction in recharge to the underlying aquifers therefore locally reducing groundwater levels. This will also increase runoff to surface water drains/ponds and may lead to flooding.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook Groundwater in the Helsby Sandstone Formation bedrock
Construction of subsurface infrastructure such as foundations	Impede shallow groundwater flow which can cause groundwater mounding on the upgradient side and reducing groundwater levels on the downgradient side.	Local	Perched water within the Peat Perched water within the Till
		Borough	None
		County	Groundwater in the Helsby Sandstone Formation bedrock
Use of cement and concrete	Accidental spills or leakage of fuel and oil from machinery and storage onsite during the construction phase could affect the underlying groundwater and enter surface water watercourses and waterbodies and lead to a degradation of water quality.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook Groundwater in the Helsby Sandstone Formation bedrock
	Leaching of cement / concrete into groundwater causing a degradation of water quality.	Local	Perched water within the Peat Perched water within the Till
		Borough	None

Proposed Development Component / Activity	Potential effects	At Risk Receptor	
		County	Groundwater in the Helsby Sandstone Formation bedrock
Removal of peat	The removal of peat could disrupt the hydraulic connection of adjacent peat leading to the remaining peat drying out.	Local	Perched water within the Peat (*in situ* peat immediately adjacent to the removed peat onsite and to the east of the Site adjacent to the gas main)
		Borough	None
		County	None
Gas pipeline – retaining wall in peat	The retaining wall within the peat could disrupt the hydraulic connection of adjacent peat leading to the peat to the east of the Site drying out.	Local	Perched water within the Peat
		Borough	None
		County	None
Working in proximity to the water environment associated with the river diversion	Temporary disruptions and restriction to the watercourse channel to surface water flows, which may lead to flooding during periods high and prolonged rainfall.	Local	None
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
Working in proximity to the water environment associated with watercourse crossing	Disruption/blockage of watercourse flow from watercourse crossing, which may lead to flooding.	Local	None
		Borough	Silver Lane Brook and onsite drains
		County	None

Table 8.1: Potential Construction Phase effects

8.3. Table 8.2 provides detailed of the impact assessment of the construction effects identified in Table 8.1. This assessment has assumed that the design mitigation and good practice measures described in Section 9 are implemented.

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Earthworks including excavations	Excavation and sequential removal of the topsoil and superficial deposits has the potential to reduce the pathway to the underlying groundwater (perched in peat and Till) and finally the bedrock aquifers therefore increasing the vulnerability of the aquifer groundwater to potential contamination/oil spills during construction.	Local County	Minor, Negative	Minor, Adverse	High
	Mobilisation of sediment, which could enter watercourse and waterbodies causing increased erosion altering deposition. This may also result in harm to aquatic flora and fauna.	Borough County	Minor, Negative	Minor, Adverse	High
Dewatering of excavations	Release of sediment and silt laden water from the discharge of water removed from excavations to watercourse and / or ground, which could cause a degradation in water quality.	Borough County	Negligible	Negligible	High
	Pumping of groundwater may cause a localised drawdown of the water table and cause water in the surrounding area to be drawn into the excavations. May cause offsite contaminated groundwater to be draw into the Site.	Local County	Minor, Negative	Minor, Adverse	High

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Use of machinery and storage of chemicals onsite	Accidental spills or leakage of fuel and oil from machinery and storage onsite during the construction phase could affect the underlying groundwater and enter surface water watercourses and waterbodies and lead to a degradation of water quality.	Local Borough County	Minor, Negative	Minor, Adverse	High
Soil stripping and vegetation removal	Soil stripping reduces soil moisture storage capacity and may increases runoff and may lead to flooding.	Local Borough County	Negligible	Negligible	High
Soil compaction	Compaction due to use of heavy machinery reduces infiltration, increases runoff and shortens the rainfall–runoff response and may lead to flooding.	Local Borough County	Negligible	Negligible	High
Construction of impermeable surfaces such as roads/pavements	Reduction in recharge to the underlying aquifers therefore locally reducing groundwater levels. This will also increase runoff to surface water drains/ponds and may lead to flooding.	Local Borough County	Minor, Negative	Minor, Adverse	High
Construction of subsurface infrastructure such as foundations	Impede shallow groundwater flow which can cause groundwater mounding on the upgradient side and reducing groundwater levels on the downgradient side.	Local County	Minor, Negative	Minor, Adverse	High

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Use of cement and concrete	Accidental spills or leakage of fuel and oil from machinery and storage onsite during the construction phase could affect the underlying groundwater and enter surface water watercourses and waterbodies and lead to a degradation of water quality.	Local Borough County	Minor, Negative	Minor, Adverse	High
	Leaching of cement / concrete into groundwater causing a degradation of water quality	Local County	Minor, Negative	Minor, Adverse	High
Removal of peat	The removal of peat could disrupt the hydraulic connection of adjacent peat leading to the remaining peat drying out.	Local	Minor, Negative	Minor, Adverse	High
Gas pipeline – retaining wall in peat	The retaining wall within the peat could disrupt the hydraulic connection of adjacent peat leading to the peat to the east of the Site drying out.	Local	Minor, Negative	Minor, Adverse	High
Working in proximity to the water environment associated with the river diversion	Temporary disruptions and restriction to the watercourse channel to surface water flows, which may lead to flooding during periods high and prolonged rainfall.	Borough County	Minor, Negative	Minor, Adverse	High

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Working in proximity to the water environment associated with watercourse crossing	Disruption/blockage of watercourse flow from watercourse crossing, which may lead to flooding.	Borough	Negligible	Negligible	High

Table 8.2: Significance of Effect - Construction Phase

8.4. With appropriate mitigation in place (See Section 9, below), the magnitude of change from the baseline condition caused by the construction operations identified in Table 8.2 has been assessed as minor, adverse or negligible. The potential change to the water environment is likely to be small changes, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions. This is due to the implementation of best practise measures in a Construction Environment Management Plan (CEMP) or equivalent.

8.5. The effect assessment found that with mitigation and good industry practise no effect was found to be greater than minor adverse, which has **no significant effect**. As such no additional receptor specific mitigation was found to be required.

Operational Phase

8.6. There are two types of operational effects on the water environment: i) those which result from the creation of the Proposed Development (e.g. the creation of impermeable surfaces causing changes in the hydrologic regime); and ii) those that occur associated with the used of the Proposed Development (e.g. accidental releases of fuel from a resident's vehicle).

8.7. Table 8.3 details potential effects that may arise from the activities of the Proposed Development during operation.

Proposed Development Component / Activity	Potential effects	At Risk Receptor	
Use of Motorised Vehicles and the	Pollution from leaks or spills, which may cause a degradation in water quality	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook

Proposed Development Component / Activity	Potential effects	At Risk Receptor	
storage of fuel and chemicals		County	Glaze Brook Groundwater in the Helsby Sandstone Formation bedrock
De-Icing of roads, walkways and parking areas	The use of de-icing salts may cause the release of sodium chloride and anti-caking agents into the water environment may cause changes to water chemistry such as salination.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook Groundwater in the Helsby Sandstone Formation bedrock
Proximity to the water environment associated with watercourse crossing	Disruption/blockage of watercourse flow from watercourse crossing, which may lead to flooding.	Local	None
		Borough	Silver Lane Brook and onsite drains
		County	None
Proximity to the water environment associated with river diversion	Changes to water flow speeds and water depth, may causes changes river upstream and downstream of the diversion, such as flooding and erosion.	Local	None
		Borough	Silver Lane Brook and onsite drains Willow Brook
		County	Glaze Brook
Peat used in habitat enhancement	The peat that is used on the Silver Lane Brook river diversion may encourage biodiversity in aquatic flora and fauna.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains
		County	None
Creation of new drainage regime in developed areas of the Site	The creation of a new drainage regime may alter the amount of runoff within the surface water catchments and groundwater recharge, thereby altering the flow rates and volumes within the watercourses in these catchments. An increase in flow rates may lead to a corresponding increase in flood risk.	Local	Perched water within the Peat Perched water within the Till
		Borough	Silver Lane Brook and onsite drains
		County	Groundwater in the Helsby Sandstone Formation bedrock

Table 8.3: Potential Operational Phase effects

8.8. Table 8.4 provides detailed of the impact assessment of the construction effects identified in Table 8.3. This assessment has assumed that the design mitigation and good practice measures described in Section 9 are implemented.

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Use of Motorised Vehicles and the storage of fuel and chemicals	Pollution from leaks or spills, which may cause a degradation in water quality	Local Borough County	Minor, Negative	Minor, Adverse	High
De-Icing of roads, walkways and parking areas	The use of de-icing salts may cause the release of sodium chloride and anti-caking agents into the water environment that may cause changes to water chemistry such as salination	Local Borough County	Minor, Negative	Minor, Adverse	High
Proximity to the water environment associated with watercourse crossing	Disruption/blockage of watercourse flow from watercourse crossing, which may lead to flooding.	Borough County	Negligible	Negligible	High
Proximity to the water environment associated with river diversion	Changes to water flow speeds and water depth, may causes changes to the river upstream and downstream of the diversion, such as flooding and erosion.	Borough County	Negligible	Negligible	High
Peat used in habitat enhancement	The peat that is used on the Silver Lane Brook river diversion may encourage biodiversity in aquatic flora and fauna.	Local Borough	Minor, Positive	Minor, Positive	High

Nature of Impact		Receptor	Environmental Impact	Significance of Effect	Confidence Level
Creation of new drainage regime in developed areas of the Site	The creation of a new drainage regime may alter the amount of runoff within the surface water catchments, thereby altering the flow rates and volumes within the watercourses in these catchments. An increase in flow rates may lead to a corresponding increase in flood risk.	Local Borough County	Negligible	Negligible	High

Table 8.4: Significance of Effect - Operation Phase

8.9. The magnitude of change from the baseline condition caused by the operational changes identified in Table 8.4 have been assessed as minor adverse, minor positive or negligible. The potential change to the water environment is likely to be small changes, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions. This is due to a suitably designed surface water drainage scheme and controlled discharges offsite. The drainage scheme, which includes the use of SuDS, and the design of the river diversion would ensure that the existing greenfield rate of surface water runoff discharged to the Silver Lane Brook is maintained and the use of peat in the river diversion may encourage biodiversity in aquatic flora and fauna

8.10. The assessment of effects has found that with mitigation and industry good practice, no effect was found to be greater than minor adverse / positive, which has no significant effect. As such no additional receptor specific mitigation was found to be required.

Water Framework Directive Assessment

8.11. Appendix 3.3 provide a Water Framework Directive (WFD) Screening Assessment for the Proposed Development. The aim of the WFD Screening Assessment is to evaluate the potential deterioration in the overall status of a water body (Surface water and Groundwater) from developments, based on the 2015 River Basin Management Plan (RBMP). It is also to determine whether the Proposed Development may hinder any existing programs of measures in returning a failing water body to Good status.

8.12. The Site lies within the Glaze Burn surface water catchment, which has an overall waterbody status of Poor, and the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers groundwater catchment, which has an overall waterbody status of Poor.

8.13. The WFD Screening Assessment found that the Proposed Development has been determined to have no effects which are likely to cause deterioration in WFD status or prevent waterbodies from achieving their WFD objectives, provided that best practice and established guidance is adhered to.

9. Proposed Mitigation

Mitigation By Design and Best Practice Guidance

9.1. Surface water runoff from the Site would be managed using SuDS or similar techniques to ensure discharge is maintained as existing, and surface water storage provided as appropriate to balance storm event flows which exceed this discharge rate. Surface water from storm events up to a 1 in 100-year event with an allowance for climate change would be contained and managed onsite. In addition, it is assumed that Proposed Development will be undertaken in line with the current guidance and codes of best practice included, but not limited to, the measure detailed in the following documents:

- CIRIA C741: Environmental Good Practice on Site Guide (4th edition).
- CIRIA C750: Groundwater control: design and practice (2nd edition).
- CIRIA C753 Sustainable Urban Drainage Systems Manual
- CIRIA C768 Guidance on the Construction of SuDS.
- CIRIA C532 Control Of Water Pollution From Construction Sites.
- CIRIA C650 Environmental Good Practice On Site (Expansion Of C502).
- CIRIA C689 Culvert Design & Operational Guide.
- The Environment Agency's approach to groundwater protection (GP3) (February 2018 Version 1.2).
- Best Available Techniques (BAT) reference documents (BREFs).
- APEA and Energy Institute Design, construction, modification, maintenance and decommissioning of filling stations (known as the Blue Book), 4th edition;
- Pollution Prevention Guidelines (PPG) 1 General Guide To The Prevention Of Pollution.
- PPG2 Above Ground Oil Storage.
- PPG4 Treatment & Disposal Of Sewage Where No Foul Sewer.
- PPG5 Works & Maintenance In, Or Near Water.
- PPG6 Working At Construction And Demolition Sites.
- PPG8 Safe Storage & Disposal Of Used Oils.
- PPG10 Pollution Prevention Guidelines Highway Depots.
- PPG21 Polluting Incident Response Planning.
- PPG22 Dealing With Spills.

9.2. It is noted that all PPGs have been withdrawn by the EA, as the legislative requirements contained within the documents are, in many cases, no longer correct; however, the PPGs are still considered to be a relevant and effective source of best practice information and are widely used and accepted within the construction industry.

9.3. In the CSHM (Section 6) it was identified that the Till (clay) that underlies the Site is likely to confine the Helsby Sandstone Formation aquifer. The underground fuel tanks for the refueling

station would be located within the Till (clay) and not in contact with Helsby Sandstone Formation. The Till would afford the Helsby Sandstone Formation aquifer a degree of protection from the underground fuel storage tanks. In addition, the refueling station would be designed in accordance with APEA and Energy Institute design, construction, modification, maintenance and decommissioning of filling stations (known as the Blue Book), 4th edition and Best Available Techniques (BAT) reference documents (BREFs).

9.4. At the detailed design phase further site investigation (SI) works will be undertaken. One of the aims of this SI would be to establish the depth of the Till (clay) that underlies the Site and in particular in the area underlaying the proposed refuelling station and underground fuel storage tanks. The SI would also aim to confirm the elevation and degree of confinement of the Helsby Sandstone Formation aquifer. The results of the SI would be used to determine if any bespoke mitigation, above general pollution prevention measures and best practise design, is required at the detailed design phase to protect the Helsby Sandstone Formation aquifer.

Construction Phase

9.5. A Construction Environmental Management Plan (CEMP) or equivalent would incorporate the key principles of the good practice, legislation, regulations and guidance. The CEMP would provide practical measures to avoid and minimise the impact of the Proposed Development on ground and surface waters, as well as providing emergency preparedness and corrective actions together with measures for monitoring, recording and disseminating of information.

9.6. The key principles of the water-related components of the CEMP will include (but are not limited to) the following:

- Construction design to minimise disruption to the natural flow regime.
- Planning and preparation of works to ensure all precautions are taken in order to provide protection to watercourses, groundwater and attenuation features, including the supervision of sub-contractors and liaison with the Local Authority and the EA area staff.
- Adoption of measures to prevent and control the release of sediment, such as directing surface water across vegetated zones or through mesh fencing in order to capture the sediment. Sediment traps or settlement lagoons may be considered if the quantity of sediment laden water is anticipated to be large. The CEMP will specify the maintenance requirements to ensure that sediment control measures, drains and pot holes are regularly inspected, cleared, infilled and/or repaired.
- Compliance with environmental permits and licenses.

- Securely storing all fuel, oils and other polluting substances within suitably bunded containers and placed upon impermeable surfaces in accordance with PPG2: Above Ground Oil Storage and PPG8: Safe Storage & Disposal Of Used Oils.
- The use of integral drip trays (of 110% of the capacity of the fuel tank) for any static machinery/ plant, where practicable. All plant, vehicles and machinery will also be regularly inspected for leaks.
- Refueling will be undertaken in a designated refueling area and the use of biodegradable oils and lubricants will be considered where possible.
- The preparation of pollution incident response plans, identifying the type and location of onsite resources (spill kits, absorbent materials, oil booms etc.) available for the control of accidental releases of pollution and other environmental incidents. These resources will be available to contractors at all times of operation.
- Update water abstractions and private water supply data searches (EA and Warrington Borough Council) and if applicable contact local residents and landowners to determine if there are unregistered abstractions i.e. example abstractions of less than 20m^3/day.
- The preparation dewatering management plan and peat handling plan.
- Cement/concrete mixes will be calculated to ensure that sufficient quantities are supplied without needing disposal of excess and cement/sand mix ratio will be monitored for consistency and suitability.

Operational Phase

9.7. Mitigation of effects upon flow rates and volumes of watercourses within the surface water catchments would be achieved through design of a suitable surface water drainage scheme for the Proposed Development, which takes into account climate change. The drainage proposals would ensure that the existing greenfield rate of surface water runoff discharged to the Silver Lane Brook is maintained and in the long term takes and into account can accommodate changes climatic changes.

9.8. The proposed Site design incorporates a number of SuDS features and it has been assumed that all foul water will be discharged to an offsite foul water sewer. The use of SuDS (full details of these would be provided at the Detailed Planning Application stage to ensure compliance to the standards applicable at the time) would provide treatment of runoff from the Proposed Development during operation. The first stage of the treatment would be a mix of pre-treatment, using swales, channel drainage, rills and gullies, to collect the surface water at source and provide an initial level of treatment. The surface water from paved areas would then be taken through petrol interceptors/forecourt interceptors. The final level of treatment and storage would be provided by a mix of tank/crate storage, smaller discrete dry basins and swales. To reduce the risk to the surrounding water environment from a major onsite incident, the drainage outfall and overflow to the Silver Lane Brook would include a

discharge shut down system. This would allow flows to be contained on the Site to allow treatment as appropriate.

9.9. Further details of the surface water management and drainage design are provided within Appendix 3.1 - .

9.10. The MSA facility would have an operation and maintenance management team who, as part of their role, would ensure all drainage systems are fully maintained and managed in accordance with best practice/guidance. In addition, a maintenance and management plan (or equivalent) would include the following: watercourse crossing; river direction pump; SuDS pond; road condition including potholes; and drains, sewage pipes and petrol interceptors. The British Standard: BS 3247:2011+A1:2016 Specification for salt for spreading on highways for winter maintenance and Highways Agency Trunk Road Maintenance Manual: Volume 2 – Routine and Winter Maintenance Code, should be following for the use of de-icing and storage of salts onsite.

10. Potential Residual Effects

10.1. As demonstrated in Table 8.2 and Table 8.4, there are no effects that are likely to give rise to significant effects. Therefore, no additional mitigation is required, above those measures already considered in the assessment (Section 9) such as the use of SuDS and good practise included in a CEMP. Consequently, no residual effects have been identified.

11. Additive Impacts (Cumulative Impacts and their Effects)

11.1. For the purposes of this ES we define the additive cumulative effects as:

> 'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself'

11.2. The developments that are likely to have a cumulative impact when considered with the Proposed Development have been scoped with the Local Authority and Key Consultees during the preparation of this ES (a full list is included within Section 9 of the ES Part One Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of water resources. These are also shown geographically on the plan included at Appendix 13 of the ES Part One Report.

No.	Cumulative Development	Details	Status	Justification for Inclusion in Cumulative Assessment
3	HS2 (adjacent to the Site)	Land safeguarded for the HS2 route Government consultation.	Current programme: Advanced works Q4 2022 Development Q4 2024 Commissioning Q4 2031 – Q3 2033	Both the HS2 project and the Site lie within the Glaze Brook surface water catchment and the Helsby Sandstone Formation groundwater catchment and SPZ3.

Table 11.1: Cumulative Development

11.3. Both Construction and Operational phases will be considered and the short, medium and long term impacts assessed.

11.4. There is a possibility of cumulative effects on the water environment occurring when two or more major developments are constructed and are operational within the same catchment at the same time. Potential cumulative effects include deterioration in water quality as a result of pollutants entering into waterbodies during construction and alteration to the hydrological regime from inappropriate drainage design resulting in increased flood risk downstream of both developments.

11.5. Owing to strict planning guidance and regulation over the water environment, other major developments within the same catchment as the Site will have to demonstrate that appropriate

drainage design and pollution prevention measures have been incorporated into their site design and will be in place during the construction and operational periods. Therefore, this assessment has assumed that the mitigation measures of the other developments would be implemented.

Short Term

11.6. In terms of the water environment, greatest risk to water receptors generally occurs during the construction periods.

11.7. HS2 project components in the vicinity of the Site comprises of earthworks, landscaping mitigation plant (scrub / woodland), rail alignment formation and wetland habitat creation with balancing pond.

11.8. Assuming that construction of HS2 and the Proposed Development overlap then there is potential for cumulative effects to occur in during this short term overlap period. These effects would largely be associated with accidental release of oil, fuel and other pollutions and well as the release of sediments from earthworks. It is assumed that during construction the HS2 project would undertake construction in line with best practise of a CEMP or equivalent as well as any water related licencing and / or permitting requirements. This is likely to include pollution prevention measures, emergency response plans. Therefore, the potential construction cumulative effects arising from HS2 and the Proposed Development are considered to be negligible

11.9. Like the construction phase, during operation the HS2 project is likely to give rise to cumulative effects with the Proposed Development, however these are largely relating to surface water drainage regimes. It has been assumed that the HS2 project will take into account surface water drainage within the Glaze Brook catchment e.g. by discharges and outfalls being restricted to the greenfield runoff rate and the use of SuDS, where applicable. Therefore, the potential operational cumulative effects arising from HS2 and the Proposed Development are considered to be negligible

Medium Term

11.10. There would be no change to the operational cumulative effects with the Proposed Development and HS2 in the medium term (6-10years).

Long Term

11.11. There would be no change to the operational cumulative effects with the Proposed Development and HS2 in the medium term (>11years).

12. Conclusion

12.1. This Technical Paper provides an assessment of the potential effects of the Proposed Development upon the water resources of the Site, focusing on effects relating to changes the hydrological and hydrogeological regime and the pollution and a degradation in water quality.

12.2. The eastern and northern boundaries of the Site are defined by relatively straight drains, while the west of the Site comprises of a drain, and Silver Lane Brook which is classified as a statutory main river. The southern boundary of the Site is marked by the M62. Silver Lane Brook is a tributary of the Willow Brook, which in turn is a tributary of the Glaze Book.

12.3. The Site is underlain by Peat deposits, which are deepest in the southeast of the Site. The Peat is underlain by glacial Till, which is underlain by sedimentary bedrock of the Helsby Sandstone Formation. According to the Environment Agency, the Peat is classed as unproductive strata, which the Till is classed as secondary undifferentiated. The Sandstone bedrock is classed as a principal aquifer and the Site is located in a Groundwater Source Protection Zone 3. The Site is located in the North Merseyside Permo-Triassic Sandstone Aquifers groundwater catchment.

12.4. There are no private water supplies within 2km of Site. There are two groundwater abstractions and four discharges within 2km of the Site, however none of these activities are occurring within 750m of the Site.

12.5. Government's Flood Map for Planning and Long Term Flood Risk online map, this shows the Site to be within Flood Zone 1 (i.e. low probability of fluvial flooding). The Site is also shown not to be significantly affected by surface water and not to be affected by reservoir flood risk.

12.6. There are three hydro-ecological designated sites, within 2km of the Site, two Sites of Special Scientific Interest (SSSI), which are also a part of the Manchester Mosses Areas of Conservation (SAC). The closest is Risley Moss, SSSI, approximately 840m south of the Site. It is thought that there is unlikely to be a hydrogeological connection between the Site and with this site or the rest of the Manchester Mosses SAC sites.

12.7. The key water related elements of the Proposed Development:

- Diversion of the Silver Lane Brook.

- Surface water drainage and SuDS features, with discharge to the diverted Silver Lane Brook.
- Watercourse crossing of diverted of the Silver Lane Brook to allow access to the gas main.
- Use of Peat in habitat creation onsite.
- Fuel Filling Station including storage of fuel, isolated drainage with petrol interceptors.
- Parking areas and associated drainage including petrol interceptors.
- Possible dewatering of excavations.
- The Proposed Development would be connected to a mains water and the sewage network.

12.8. Construction effects can be categorised into two types: i) those that relate to the act of carrying out construction (e.g. earthworks causing sedimentation of watercourses); and ii) those that relate to the construction of the development itself (e.g. the creation impermeable surfaces, such as roads and buildings, within the catchment). The effect assessment found that with mitigation and good industry practise (e.g. measures in a Construction Environmental Management Plan (CEMP)) no effect was found to be greater than **minor adverse**, which has **no significant effect**. As such no additional receptor specific mitigation was found to be required.

12.9. There are two types of operational effects on the water environment: i) those which result from the creation of the Proposed Development (e.g. the creation of impermeable surfaces causing changes in the hydrologic regime); and ii) those that occur associated with the used of the Proposed Development (e.g. accidental releases of fuel from a vehicle). The assessment of effects has found that with mitigation and good industry practise (e.g. drainage scheme, which includes the use of SuDS, and the design of the river diversion would ensure that the existing greenfield rate of surface water runoff discharged to the Silver Lane Brook is maintained) no effect was found to be greater than **minor adverse**, which has **no significant effect**. As such no additional receptor specific mitigation was found to be required.

12.10. The Flood Risk Assessment (FRA) found that the Proposed Development has no flood risk from tidal, sewer or artificial sources and a low risk of flooding from fluvial, pluvial/overland and groundwater sources. It is also considered that any residual flooding can be mitigated. The surface water management strategy for the Site concluded that a surface water drainage system, with storage, for the Site can be provided which ensures no increase in flood risk on or off the Site. The surface water management strategy also provides a reduction in the surface water runoff from the existing land thereby reducing flood impacts to the surrounding area.

The Water Framework Directive (WFD) Screening Assessment for the Proposed Development found that the Proposed Development has been determined to have no effects which are likely to cause deterioration in WFD status or prevent waterbodies from achieving their WFD objectives, provided that best practice and established guidance is adhered to.

12.11. The cumulative effect assessment found the effect on the water environment as a result of HS2 and the Proposed Development to be negligible for all lifecycles of these projects. This is due to strict planning guidance and regulation over the water environment, both projects will have to demonstrate that appropriate drainage design and pollution prevention measures have been incorporated into their site design and will be in place during the construction and operational periods.

12.12. The assessment found that, with appropriate mitigation in place, the scale of potential effects was no greater than minor (adverse or positive). As such, there would be **no significant effect** on the water environment.

13. Reference List

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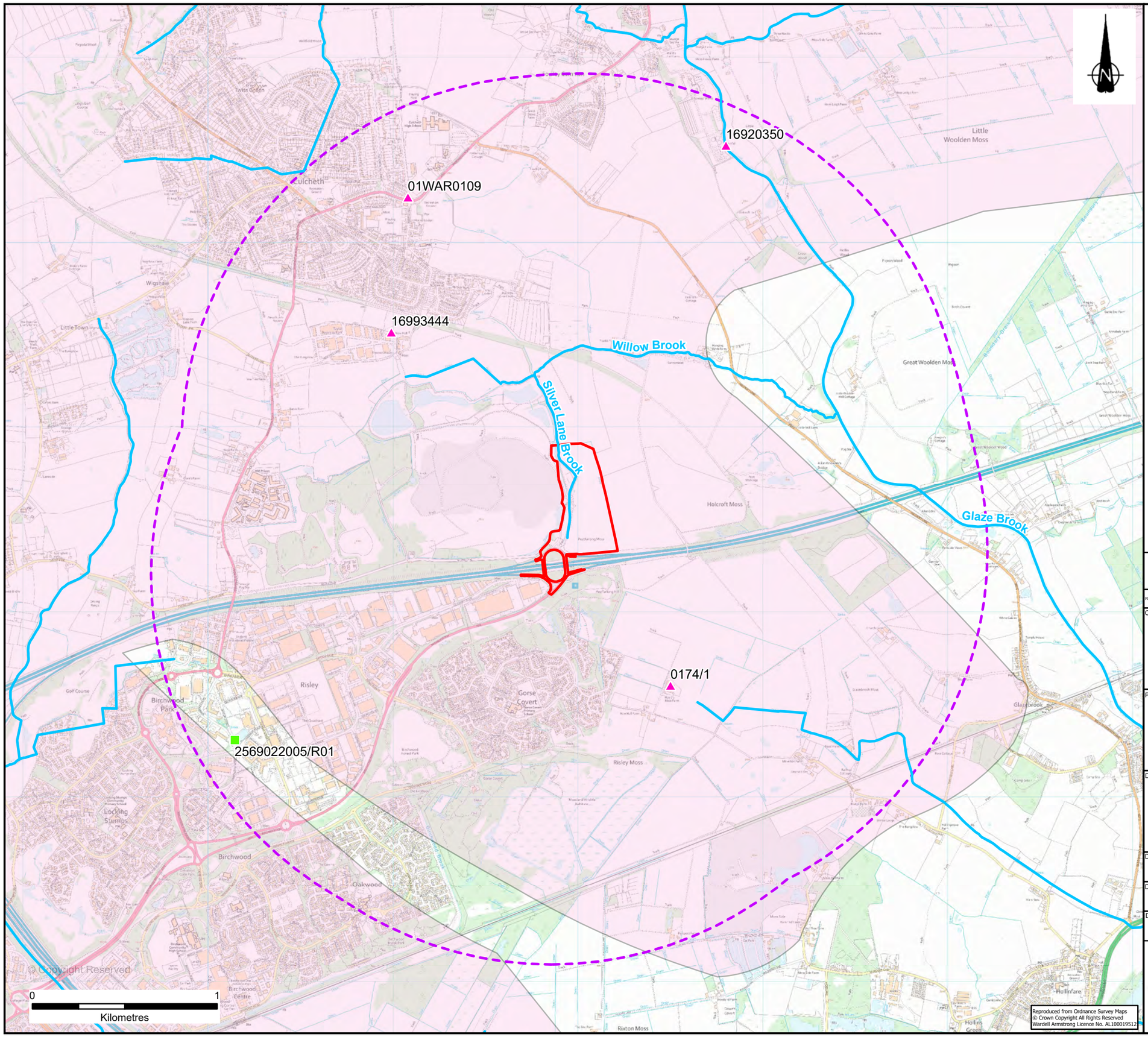
14. Figures

Figure 3.1- Local Water Resources



KEY

- Site Boundary
- 2km Buffer
- Main Rivers
- Source Protection Zone 3: (Total Catchment)
- Discharge
- Abstraction

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
B	AMENDED SITE BOUNDARY	JULY 2019	SW	RG	LB
A	FIRST ISSUE	APRIL 2019	HM	RG	LB

CLIENT

EXTRA MSA GROUP

PROJECT

MOTORWAY SERVICES, WARRINGTON

DRAWING TITLE

FIGURE 3.1
LOCAL WATER RESOURCES

DRG No.		REV
SH11739/Figure 3.1		A
DRG SIZE	SCALE	DATE
A3	1:20,000	22/08/2019
DRAWN BY	CHECKED BY	APPROVED BY
HM	RG	LB

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15. Appendices

Appendix 3.1 – Flood Risk Assessment and Surface and Foul Water Drainage Strategies

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ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING AND MINERAL PROCESSING
MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

EXTRA MSA GROUP

Warrington MSA, J11 M62

Flood Risk Assessment and Surface and Foul Water Drainage Strategies

August 2019

wardell armstrong

Wardell Armstrong
City Quadrant, 11 Waterloo Square, Newcastle upon Tyne, NE1 4DP, United Kingdom
Telephone: +44 (0)191 232 0943 Facsimile: +44 (0)191 261 1572 www.wardell-armstrong.com

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REPORT NUMBER: **Appendix 3.1/Version 4 (Final)**

EXTRA MSA GROUP

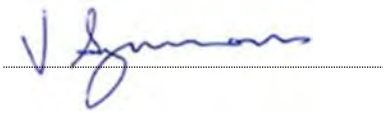
Warrington MSA, J11 M62

Flood Risk Assessment and Surface and Foul Water Drainage Strategies

August 2019

PREPARED BY:

Julian Symmons Technical Director



APPROVED BY:

David Brignall Director

ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING AND MINERAL PROCESSING
MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

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SH11739-002D	Brook Diversion Plan and Sections
RMS - 519 - ZZ - XX - DR - A - 0751	Indicative Site Plan (Architecture 519 Drawing Rev P9)
SH11739-003C	Proposed Surface and Foul Water Drainage Strategies

1 INTRODUCTION

1.1 General

1.1.1 This Flood Risk Assessment and Surface Water Drainage Strategy has been produced to accompany an Outline Planning Application ('the application') submitted on behalf of Extra MSA Group for the proposed Motorway Services Area (MSA) on land to the north east of Junction 11 of the M62 Motorway.

1.1.2 A full description of the proposals is contained in the Environmental Statement chapter titled '*Project Description (Scoping)*'.

1.1.3 This report should be read in conjunction with the Environmental Statement for the proposals, with specific reference to Part 2 documents titled '*Geology and Ground Conditions Technical Papers No 7*, '*Water Resources Technical Paper No 3*' and '*Agricultural Land and Soils Technical Paper No 16*'.

1.2 Purpose of this report

1.2.1 As part of the full Site assessment, flood risk and surface and foul water drainage provision to support and serve the new MSA have been examined to demonstrate suitability and compliance with UK legislation. This report provides a Flood Risk and Surface and Foul Water Drainage Strategies Assessment associated with the Site having regard to its proposed end use and current UK legislation.

1.2.2 This report demonstrates that, for the Outline Planning Application stage, the Site is appropriate in terms of flood risk and surface and foul water drainage requirements.

1.2.3 As the proposed scheme is currently in Outline Planning Application form, the proposals for the flood and surface and foul water drainage management from the Site are provided in outline form. However, these outline proposals provide the framework and design principals that will be used for the Reserve Matters application stage.

1.2.4 Consultation with key Stakeholders, including Warrington Borough Council as Lead Local Flood Authority and the Environment Agency, have been completed in the preparation of this report.

1.3 National Planning Policy

1.3.1 The Department for Communities and Local Government (DCLG) published the National Planning Policy Framework (NPPF) in March 2012, and the Planning Practice Guidance in March 2014, both of which were updated in February 2019. The NPPF replaces the guidance previously contained within Planning Policy Statement 25 (PPS25) – Development and Flood Risk.

1.3.2 The NPPF and the accompanying Planning Practice Guidance aim to ensure that flood risk is taken into consideration at all stages of the planning process in order to avoid inappropriate development in areas at medium to high risk of flooding.

1.3.3 The NPPF and the Planning Practice Guidance advocate the use of a risk-based 'Sequential Test' to direct development away from areas at the highest risk of flooding. Where development is necessary in high risk areas, the NPPF aims to ensure that the development is safe without increasing flood risk and where possible, reducing flood risk overall. Table 1 below, extracted from Table 1 of the Flood Risk and Coastal Change section of Planning Practice Guidance, defines the levels of flood risk within England.

Table 1: Flood Zones

Flood Zone	Flood Zone Classification	Description
Flood Zone 1	Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding
Flood Zone 2	Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Flood Zone 3a	High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

1.3.4 As part of the requirements of the Flood Risk Regulations, which implement the requirements of the European Floods Directive, the Environment Agency (EA) has produced Flood Hazard and Flood Risk Maps for England and Wales. The

Government has taken these Flood Maps, which are available online, and has prepared information that shows the risk of flooding from rivers, the sea, surface water and reservoirs for a number of scenarios. The Long Term Flood Risk Assessment for Locations in England indicates areas which may be affected by a 1 in 100 year fluvial flood or a 1 in 200 year tidal/coastal flood, i.e. Flood Zone 3 as defined in the NPPF. It also indicates which areas may be affected by an extreme flood, i.e. Flood Zone 2 as defined in NPPF. The Government has also published the Flood Map for Planning which excludes the effect of flood defences.

1.3.5 The Government's Map for Planning for the development area shows that the Site is within Fluvial Flood Zone 1 (see Annex 1).

1.3.6 The Government's Long Term Flood Risk Assessment for Locations in England shows the site is generally unaffected by surface water flooding with only some localised ponding shown. There is no flood flows across the site shown.

1.3.7 The Government's Long Term Flood Risk Assessment for Locations in England reservoir flood map shows that the site is unaffected by a reservoir breach.

1.3.8 Warrington Borough Council's Warrington Level 1 Strategic Flood Risk Assessment (SFRA Level 1) dated January 2008 and Level 2 Strategic Flood Risk Assessment (SFRA Level 2) Volume I and 2 dated September 2011 are planning tools that investigate and identify the extent and severity of flood risk across the whole borough. The Site is not referred to as being adversely affected by flood risk, as shown on FRA Level 1 Map 5, and it is not shown as being in an area susceptible to groundwater flooding.

1.3.9 Warrington Borough Council's Surface Water Flooding Evidence Base dated May 2012 studies the risk from surface water flooding and sets out a framework for managing the risk now and in the future. As with the SFRA reports, the Site is not referred to as being adversely affected by flood risk.

1.3.10 Warrington Borough Council's Local Flood Risk Management Strategy 2017 – 2023 dated December 2017 presents the local strategy for flood risk stakeholders to collaboration to help protect the area from flood risk. It also details how flood risk is to be managed by the Council. The report shows a similar level of flood risk to the Site as the Government Flood maps and it indicates that there are no records of historical flooding. The site is also not shown to be in an area susceptible to groundwater flooding.

2 SITE SETTING

2.1 Site Description and Location

2.1.1 A summary of the Site and its characteristics is provided in Table 2: 'Site Location Summary' below.

Table 2: Site Location Summary	
Site Name	**Warrington MSA, J11 M62**
Site Address	**Land to the north east of Junction 11 of the M62 Motorway.**
Site Area (ha)	**Approx 15.41 ha**
Approximately Centred on National Grid Reference	**367056 E, 393667 N**
Existing Land Use	**Agricultural**
Proposed Land Use	**MSA with hotel, commercial, retail, fuelling and car/HGV Parking**
Local Planning Authority	**Warrington Borough Council**
Environment Agency Area	**North West**
Sewer Undertaker	**United Utilities**

2.1.2 The Site is approximately 15.41 hectares in size and comprises pasture and arable farmland, located north of the M62 Motorway at Junction 11.

2.1.3 Direct access into the Site is off Junction 11 off the M62.

2.1.4 The southern boundary of the site consists of the M62 Motorway corridor and the Junction 11 slip road. To the west is the restored Risley Landfill and to the east and north is arable farmland.

2.1.5 The Site is approximately rectangular in shape and has a shallow fall, to the east and west from south (25mAOD) to north (19mAOD).

2.1.6 The Site is located to the northeast of the urban area of Warrington, approximately 8.5km (5 miles) from the centre of Warrington with the settlement of Culcheth lying 2 km (1.2 miles) to the north west.

2.1.7 The nearest named watercourse to the Site is the Silver Lane Brook, designated as main river. It meanders along the western boundary and partly into north western edge of the Site for a short section.

2.1.8 The Silver Lane Brook starts at the southern end of the Site and is fed by a 900mm dia culvert which receives surface water flows from the restored Risley Landfill to the west. This watercourse has a variable channel profile, typically having a base width of 1m or more and a depth of 0.8m or more. It's longitudinal gradient various between 1 in 600 to 1 in 2000. There are a number of culverted crossing points allowing access to the eastern field. The brook has significant areas of ponding/standing water along its channel.

2.1.9 The Silver Lane Brook, after passing the north west corner of the Site, runs north into Willow Brook which in turn runs eastward to Glaze Brook, which is approximately 1.4km east of the site.

2.1.10 An unnamed watercourse also runs approximately three quarters of the length of the site along the eastern boundary from the south to north. At this point it is culverted to the north and is understood to discharge to the Silver Lane Brook offsite to the north. A culvert to the south end of the watercourse also exists and this connects into the motorway drainage system to the south via a backdrop. The watercourse predominately falls from south to north and was dry at the time of the inspection.

2.1.11 Within the restored Risley Landfill to the west, there are a series of ponds and ditches/channels which form the surface water management system for this area. Approximately a third of the restored landfill drains to the southern boundary and into a pond to the south east corner of the restored landfill. This pond (reference Pond 6) has a controlled 375mm dia orifice outfall which is noted as connecting to the 900mm dia culvert which outfalls to the Silver Lane Brook (see Annex 2). This pond design is noted as having an allowance of 10% for climate change.

2.1.12 The owner of the restored landfill, Biffa Waste Services Limited (Biffa), has confirmed that the estimated discharges from the pond outfall to the Silver Lane Brook are:

- 1:2yr – 305.6l/s;
- 1:10yr – 373.7l/s;
- 1:30yr – 423.6l/s;
- 1:100yr – 488.7l/s; and
- 1:100yr + 40% CC – 565.4l/s.

2.1.13 Biffa note that the current restored landfill surface water ponds/drainage to the boundary with the Site fall towards the south west and to the M62. Any flooding predicted from this system is envisaged to run to this area.

2.1.14 Biffa are currently reviewing the restoration surface water drainage design to reduce the catchment and discharge to and from pond 6 and also to improve flood storage to provide a 40% climate change allowance.

2.1.15 Drawing SH11739-001 title 'Site Location, Topography and Existing Drainage Plan' shows the Site details.

2.2 Existing Surface Water Drainage Regime

2.2.1 Surface water runoff from the Site drains primarily through ground infiltration and overland flow to both the Silver Lane Brook to the west and the unnamed watercourse to the east. Some agricultural land drainage was evident on the Site but the extent of this has not been verified.

2.2.2 The Greenfield flow, Q_{bar}, from the existing Site has been estimated as 4.61 litres/second/hectare (l/s/ha) using the Institute of Hydrology Report 124 (IH124) Flood Estimation for Small Catchments approach. The 1 in 100 year Greenfield flow, Q_{100}, is estimated as 9.57 l/s/ha (see Annex 3).

2.3 Flooding History

2.3.1 The Silver Lane Brook and the unnamed watercourse to the east are shown as being in Flood Zone 1 with a low risk of flooding.

2.3.2 The restored landfill site which is the primary source of flow in the Silver Lane Brook has been designed to limit surface water flow and provide onsite surface water storage, in the form of ponds. On this basis the flows are within the expected capacity of the brook and therefore flood risk is considered to be low along the western boundary.

2.3.3 The unnamed watercourse to the east has a very limited catchment contributing to its flows as the higher land to the east falls away from the watercourse and only a small area of the site contributing to its flow. The channel is quite deep and wide and flows are considered to be within the capacity of the channel. The outfall is a 300mm dia culvert and there is a risk that this blocks with debris however, any flooding from

the channel would be expected to run along the eastern boundary to the north and would not be expected to affect the development area.

2.3.4 No other evidence that the Site has suffered historical flooding from a review of the available flood mapping, SFRAs, SWMP and consultation with Warrington Borough Council has been identified.

2.3.5 As the Site is quite flat, some surface water ponding would be expected however, it is considered that this will be limited in nature and extent as it relates to localised hollows with in the ground profile.

2.3.6 No other information regarding historical flooding on the site has been identified during the preparation of this report.

2.4 Ground Conditions

2.4.1 The Environmental Statement Part 2 documents titled '*Geology and Ground Conditions Technical Papers No 7*' and '*Agricultural Land and Soils Technical Paper No 16*' detail the soils, geology and hydrogeology conditions expected across the Site.

2.4.2 In terms of flood risk the following summarises the key findings. Should more detailed information be required then reference to the relevant technical paper and associated documents should be made.

Ground Condition Findings

- Made ground of an unknown nature, thickness and extent may be present on site associated with the demolition of former buildings however, none was observed during the preliminary site investigation.
- Peat was identified in varying thicknesses in the eastern part of the Site with increasing thickness toward the south east. The western part of the Site is shown to be underlain by Till deposits. These were observed in the north west of the Site to comprise of cohesive deposits comprising sandy clay with a minor component of fine to coarse gravel with a generally rounded angularity. Lithologies were variable from igneous granite to sedimentary mudstone, shale and red sandstone;

- The solid strata were noted as Helsby Sandstone Formation. This was not observed during preliminary site investigation;
- British Geological Information Services indicate a high potential for compressible ground stability hazards on Site;
- Hydrogeological information indicates the Site to be underlain by superficial deposits of Peat and Till which are classified as Unproductive Strata and Secondary Undifferentiated Aquifer respectively. The underlying solid strata are classified as a Principal Aquifer;
- There are nine active groundwater abstraction licences within influencing distance of the site (2km);
- The Site lies within Source Protection Zone III (Total Catchment) for a major public groundwater supply located 4km north west of the site;
- The soil vulnerability classification groups of the soil in the east of the Site has an intermediate leaching potential while the soil in the west has a low leaching potential;
- The nearest graded surface watercourse is the Glaze Brook, which is approximately 1.4km east of the site. This watercourse was assessed to have an overall poor quality in 2006; and
- The Environment Agency map entitled Risk of Flooding from Rivers and Sea indicates the Site to be within a Very Low risk area with a chance of flooding each year being less than 1 in 1000 (0.1%). The surface water flooding map shows some flooding is possible in the western areas of the Site in the vicinity of the drain and existing farm buildings.

Soil Findings

- The soil survey confirmed the existence of peat over the majority of the Site. The peat was deepest towards the southeast of the Site, but thins out towards the north where, in the north-west corner, organo-mineral soils were identified; typically organic-rich clay loams over slowly permeable clays;
- The peat topsoil is characterised by highly degraded, amorphous acidic black peat. Although identified as a peat topsoil, the lack of an active living layer of peat, this topsoil can be treated as an organic-rich soil; and

- Where the peat extends below the topsoil identified above, the peat is characterised by an increasing water content with depth together with an increasing content of fibres (fine and coarse) and wood remains, highlighting the reduced degradation of the deeper peat.

3 PROPOSED DEVELOPMENT

3.1 Description of Site Proposals

3.1.1 The development proposals consist of the erection of a Motorway Service Area including Facilities Building, Hotel, Fuel Filling Station and associated infrastructure as shown on Architecture 519 Drawing RMS-519-ZZ-XX-DR-A-0751 Rev P9 titled 'Indicative Site Plan', Full details are contained in the Environmental Statement chapter titled *'Project Description (Scoping)*'.

3.1.2 As part of the works, due to site constraints, the existing Silver Lane Brook is to be diverted to the east of the Site. Drawing SH11739-002D title 'Brook Diversion Layout and Sections' shows the preliminary diversion proposals. The diversion need is detailed in the Environmental Statement chapter titled '*Project Description (Scoping)*' and Part 2 document titled '*Water Resources Technical Paper No 3*'.

3.1.3 Access to the Site will be taken from the existing Junction 11 of the M62 Motorway, via the existing spur from the roundabout at Junction 11 and access and circulation roads and footpaths will be provided between the various on-site facilities. The MSA will be a 24 hour operation.

3.1.4 The proposed layout for the Site and the associated brook diversion have been developed to take account of flood risk and to include sufficient land to allow robust surface and foul water management strategies to be incorporated.

3.1.5 Drawing SH11739-003B titled 'Proposed Surface and Foul Water Drainage Strategies' details the preliminary main drainage networks and the proposed surface water storage and outfall.

3.2 Vulnerability Classification

3.2.1 The flood zones, land use vulnerability classifications and corresponding compatibility are shown in the NPPF Technical Guidance. The Government's mapping indicates that the Site is within Flood Zone 1.

3.2.2 Following Table 2, of the Technical Guidance, the vulnerability class for the proposed development is 'more vulnerable' based on the hotel and HGV overnight parking elements.

3.2.3 Table 3, of the Technical Guidance, 'Flood Risk Vulnerability and Flood Zone Compatibility', shows that 'more vulnerable' development are suitable uses for land in Flood Zone 1.

3.3 The Sequential Test and Exception Test

3.3.1 The Sequential Test, as set out in the NPPF Technical Guidance, aims to steer development to areas with the lowest risk of flooding (i.e. to direct developments to Flood Zone 1 where possible).

3.3.2 As the Site is in Flood Zone 1 the Sequential Test and Exception Test are not applicable.

3.4 Development Surface Water Drainage Proposals

3.4.1 The proposed surface water drainage strategy is outlined on Drawing SH11739-003C titled 'Proposed Surface and Foul Water Drainage Strategies' and the following section outlines the basis of this design. It is considered that the surface water drainage strategy demonstrates that an acceptable surface water drainage management system can be implemented to meet the NPPF, Environment Agency and Warrington Borough Council's required drainage and flood risk planning policies.

3.4.2 Site investigation and further detailed design of the surface water drainage proposal will be required to allow finalisation of this strategy.

3.4.3 Surface water from the new development is required to be prioritised as outline in the Building Regulations. The hierarchy defines that surface water discharge should be discharged to ground as a first option, followed by a watercourse and finally to a sewer if the previous options are not feasible.

Infiltration Discharge

3.4.4 The initial ground condition information indicates that the Site is partly covered in peat and Glacial Till superficial. Discharge into the peat is not considered to be an

acceptable option due to water quality requirements. The Glacial Till is considered to have limited and inconsistent infiltration properties and groundwater regime.

3.4.5 The Site is also within a ground water Source Protection Zone III (Total Catchment) area which indicates that groundwater in the area is extracted as a water supply and therefore discharge to ground from large scale development is not considered to be a preferred option. In consultation with the Environment Agency it was indicated that they preferred that infiltration was not used.

3.4.6 On the above basis, the use of an infiltration discharge is considered not to be appropriate for the Site.

Watercourse Discharge

3.4.7 There are two watercourses close to the site, the Silver Lane Brook to the west and an unnamed watercourse to the east. The unnamed watercourse discharges into the Silver Lane Brook, offsite to the north.

3.4.8 The current overland surface water flows from the Site discharge directly into these watercourses.

3.4.9 On the above basis, it is considered that a watercourse discharge option is feasible.

3.4.10 It is noted that the Silver Lane Brook is being diverted as part of the proposals. The diversion has been designed to ensure that there is sufficient capacity for the contributing catchment, including the Site area.

Sewer Discharge

3.4.11 United Utilities do not have surface water sewers within the area and therefore discharge to a sewer is not feasible.

3.4.12 On the above basis, it is concluded that a watercourse discharge is the preferred option for the surface water drainage strategy of the development and meets the discharge hierarchy defined in the Building Regulations.

Surface Water Drainage Proposals

3.4.13 As identified above, the surface water drainage strategy is to discharge development flows to the diverted Silver Lane Brook at greenfield runoff, Q_{bar}, and provide surface water storage for storm events that exceed this discharge rate.

3.4.14 The surface water storage has been sized to contain all storm events up to and including a 1 in 100 year storm event including an allowance of 20% for climate change.

3.4.15 It is estimated that the Site area, excluding the gas main easement, equates to 8.7ha and this therefore gives Q_{bar} as 40.1 l/s (based on 4.61 l/s/ha as detailed in Section 2.2) and Q_{100} as 83.3 l/s (based on 9.57 l/s/ha as detailed in Section 2.2).

3.4.16 Restricting the discharge from the Site to Q_{bar} for all storm events up to the 1 in 100 year with a climate change allowance will reduce the current existing discharge from the site by over 50% thereby providing flood risk betterment downstream of the Site.

3.4.17 The total contributing area for the Site, covering a percentage of unpaved area, buildings, roads and carparking, is estimated as 6.4ha.

3.4.18 Based on the Q_{bar} discharge rate and contributing area the storage requirements are estimated as 1 in 30 year, 1800m^3 and 1 in 100 year with 20% climate change 3150m^3 (see Annex 4).

3.4.19 As detailed in the Environmental Statement Part 2 document titled '*Water Resources Technical Paper No 3*', the Silver Lane Brook diversion is relatively shallow in depth and to minimise the environmental impact from raising the Site, a pumped discharge to the diverted brook is proposed to serve as the outfall for the development.

3.4.20 The pumped outfall will consist of a two pump system, duty and standby pumps, and will pump the discharge at the Q_{bar} rate (40.1 l/s). The outfall will be to the central area of the Silver Lane Brook diversion.

3.4.21 It is proposed that the main surface water storage will be provided in a mix of tank/crate storage, filter drains, smaller discrete dry basins and swales.

3.4.22 The preliminary main drainage layout is shown on Drawing SH11739-003C titled 'Proposed Surface and Foul Water Drainage Strategies'. This shows the main drainage networks and the proposed surface water storage and outfall. The drawing provides an indication of the proposed sustainable drainage systems being considered to provide water treatment. This includes the use of drainage rills such as channels/kerbs drains, filter drains, smaller discrete dry basins and swales.

3.4.23 All surface water drainage will be designed and constructed to meet Building Regulation and best practice drainage design guides/standards as appropriate.

3.4.24 As noted, water treatment is proposed to be incorporated in the design to reduce the risk of the surface water contamination. The Environmental Statement Part 2 document titled '*Water Resources Technical Paper No 3*' considers water quality in detail and should be referred to.

3.4.25 The on-site surface water drainage will be designed to incorporate, where feasible, a water management treatment train prior to discharge to the diverted Silver Lane Brook. This will consist of the following approach:

- The majority of surface water from roof and paved areas will be separately drained with roof drainage being directed to the drainage network without going through petrol interceptors;
- The paved areas will have pre-treatment, using swales, channel/kerb drainage (rills) and gullies, to collect the surface water at source and provide an initial level of treatment; and
- The final level of treatment for all surface water will be provided through petrol interceptors/forecourt interceptors.

3.4.26 The pumpstation will be provided with emergency shut down systems to ensure that if any contamination was detected in the on-site drainage system then discharge to the brook can be stopped and appropriate mitigation taken.

3.4.27 It is considered that with the surface water storage provided, should the pumps fail then there will be between 8 to 24hrs, depending on storm intensity, storage available prior to any flood risk to the Site occurring. This will allow adequate time to implement mitigation, either through pump repairs or temporary pumping, should the pumps fail.

3.4.28 The paving construction will be designed to minimise the risk of any contamination infiltrating into the ground with the fuel station forecourt standing areas being surfaced in concrete and bituminous surfacing used in access roads and car/HGV parking areas.

3.4.29 Good management procedures will be implemented to deal with any fuel and oil spillages and for managing and controlling the use of on-site de-icing materials. These procedures will be fully detailed at the Reserve Matters stage but will include consideration of the following:

- Safe and secure storage of anti-icing/de-icing materials to prevent contamination and degradation of the materials;
- Implementation of a de-icing procedure which will control and optimise spread rates thereby ensuring unnecessary use, waste and environmentally harm;
- Implementation of a spillage notification system and emergency action plans;
- Provision of on-site oil spill kit with sorbent materials to allow potential spillage containment;
- Fuelling area drainage shut down procedures to reduce the risk of off-site contamination;
- Oil level alarms to be fitted to all petrol interceptors; and
- Provision of suitable training for relevant site staff in dealing with surface water management and emergency planning/implementation.

3.4.30 Subject to site investigation, to minimise the risk of cross contamination to groundwater consideration of using impermeable barriers within the surface water drainage construction design will be undertaken to reduce the risk of infiltration. This will cover the swales, filter drains and small discrete dry basins designs.

3.4.31 The below ground petrol interceptors will be designed to be appropriate for the ground and groundwater conditions. Where considered necessary, the use of an impermeable barrier and a leakage detection system will be implemented to minimise the risk of cross contamination to ground water from potential tank leakage.

3.4.32 The outline levels design of the Site has been developed to allow flows from an extreme exceedance flood event to be routed to non-essential/sacrificial areas and

away from the buildings. Safe access through the Site will be retained as far as possible.

3.4.33 This initial surface water management strategy demonstrates that the discharge rate from the development can be controlled to replicate and reduce the greenfield peak discharge response time of the catchment. It is also considered that construction of the proposed drainage systems can be completed to protect the environment.

3.4.34 Maintenance of the surface water drainage proposal is outlined in Section 3.7.

3.5 Foul Water Drainage

3.5.1 The proposed foul water drainage strategy is outlined on Drawing SH11739-003C titled 'Proposed Surface and Foul Water Drainage Strategies' and the following section outlines the basis of this design. It is considered that the foul water drainage strategy demonstrates that an acceptable foul water drainage management system can be implemented to meet the NPPF, Environment Agency and Warrington Borough Council's required drainage and flood risk planning policies.

3.5.2 Consultation with United Utilities has been undertaken and it has been agreed that the foul water flows from the Site can be discharged to their sewer network in Leacroft Road to the south west.

3.5.3 Due to ground levels, the foul water flows will be pumped to the public sewer. All foul water from the buildings will be collected by a separate foul drainage system and taken to a foul water pumpstation located centrally within the Site.

3.5.4 The pumpstation will discharge via a rising main to the receiving public sewer located within Leacroft Road. The pumpstation will be provided with an emergency storage capacity to allow a response time should the pumps failure.

3.5.5 The design of the foul water drainage system will be fully detailed at the Reserve Matters stage. All foul water drainage will be designed and constructed to meet the requirements detailed in Sewers for Adoption published by the Water Research Council and/or to Building Regulation standards as appropriate.

3.5.6 Maintenance of the foul water drainage proposal is outlined in Section 3.7.

3.6 Silver Lane Brook Diversion

3.6.1 As noted in Section 3.4, part of the development proposal is to divert the Silver Lane Brook around the eastern Site boundary.

3.6.2 The proposed route of the diverted brook is shown on Drawing SH11739-002D, titled 'Brook Diversion Plan and Sections'.

3.6.3 The existing brook is a relative narrow, channel width being 1m or more, with a longitudinal gradient range between approximately 1 in 400 and 1 in 2000. The channel has two culverted crossings allowing access into the eastern agricultural fields. There are numerous areas of standing water along its length.

3.6.4 As noted previously, the brook receives its flow from a half-submerged 900mm dia inlet pipe to the south western corner of the site. The 900mm dia pipe has a grille across the pipe face. This 900mm dia inlet pipe collects clean surface water flows from the Biffa restored Risley landfill site's surface water drainage system. The discharge from the restored landfill site has been confirmed by Biffa to be restricted to 565.4l/s for the 1 in 100yr + 40% CC storm event. Biffa has also noted that they are considering improving their on-site surface water management which will reduce surface water discharge by over 40%.

3.6.5 To divert the brook around the eastern boundary, the average longitudinal gradient will be approximate 1 in 1300 which is within the current range of the existing brook. The water entering the brook is relatively clean as it has travelled through a variety of treatments within the restoration area that removed debris and silts.

3.6.6 The brook diversion has, at this outline stage, been designed to provide a minimum channel capacity of 1000 l/s based on an assumed manning roughness of 0.04 (classed as natural streams - sluggish with deep pools). The channel's minimum width is 1m and has 1 in 3 batters. The channel is a minimum 1m deep and has a freeboard of 300mm included. This provides a significant additional capacity to the predicted Biffa restored Risley landfill 1 in 100 year with 40% climate change confirmed flow.

3.6.7 The proposed brook diversion has been designed with an alignment that follows the eastern boundary of the development with localised widening provided at available points to offer landscaping opportunities. There may also be a need to include some

localised areas of retaining wall which will offer further variation opportunities to the flow, habitat and landscaping within the brook's restored corridor.

3.6.8 One culverted crossing is included in the design to allow access to the eastern land and the gas main. This culvert will be sized as per the inlet of the watercourse, 900mm dia minimum, to replicate the existing flow capacity.

3.6.9 No development proposals exist to the eastern side of the brook diversion while to the west generally only the proposed development's access road and landscaping is in close proximity. The access road and landscaping areas will facility direct maintenance access to the brook with minimal environmental impact expected. No buildings are proposed near to the diverted brook.

3.6.10 The design ensures that the brook diversion mimics the existing brook's flow characteristics, is not a flood risk source and can be maintained throughout the life of the development.

3.6.11 Maintenance of the brook diversion proposal is outlined in Section 3.7.

3.7 Development Outline Drainage Maintenance

3.7.1 The MSA facility will have an operation and maintenance management team who, as part of their role, will ensure surface water drainage, the brook diversion and the private sections of the foul drainage systems are fully maintained and managed in accordance with best practice/guidance. Full details of the drainage maintenance will be provided at the Reserve Matters stage however, the following outlines the anticipated works.

3.7.2 Consultation with United Utilities is ongoing regarding the adoption and therefore maintenance management of the foul water pumpstation. It is proposed that the foul water pumpstation will be maintained by United Utilities rather than the onsite management team. However, if this is not the case then the management team will appoint a specialist contractor to maintain the system to the appropriate standard.

3.7.3 All debris and grass/landscape cuttings created will be removed from drainage areas and disposed of in agreed locations.

3.7.4 All routine inspections will be recorded to allow comparison to previous inspections thereby ensuring that the maintenance history and any changes to the systems can be identified and reviewed.

Diverted Silver Lane Brook

3.7.5 The length of the diverted brook will be inspected initially on a 3 monthly basis and after any extreme rainfall events to check that it is performing satisfactorily with no signs of silt/debris build up within the channel, to grilles or culverts. The inspection will include checking of the channel, banks and structures to ensure no scouring or damage is taking place.

3.7.6 Clearing and repairs will be undertaken as required in accordance with any consents required.

3.7.7 The frequency of inspections will be reviewed after 1 year and revised as considered appropriate.

Development Surface Water Drainage

3.7.8 The development drainage systems will be routinely inspected in accordance with the guidance provided in the Ciria SuDs Manual Report C753.

3.7.9 Any leakage detection systems will be inspected every 3 months.

3.7.10 Maintenance to pumpstation and petrol interceptors will be completed in accordance with the manufacturer's requirements.

3.7.11 Litter management will be implemented monthly or as required.

3.7.12 Landscape maintenance will be agreed to suit the proposed planting and functioning of areas.

3.7.13 Swales grass cutting will be monthly or as required. Removal of silt build-up and outlets will be inspected and cleared as required.

3.7.14 Gullies and channels will be cleaned out annually or as required.

3.7.15 Pipes, chambers and crate storage will be inspected on a 5-10 year cycle or as required by the manufacturers to assess condition and any cleaning or repairs.

3.7.16 The frequency of inspections will be reviewed after 1-2 years and revised as considered appropriate.

Development Foul Water Drainage

3.7.17 The development foul water drainage systems will be routinely inspected on a 5-10 year cycle or as required by the manufacturers to assess condition and any cleaning or repairs.

3.7.18 Maintenance of the pumpstation will be by United Utilities or by the management team in accordance with the pump manufacturers requirements.

3.7.19 The frequency of inspections will be reviewed after 1-2 years and revised as considered appropriate.

4 FLOOD RISK

4.1 Flood Risk – to the Development

4.1.1 The main sources of potential flooding are from rivers, tidal waters, high land/ overland runoff, high water tables, sewers/drains, and from artificial sources such as canals or reservoirs.

4.1.2 The presence of a potential flooding source within the vicinity of the Site does not necessarily translate into a high risk of flooding. Table 3 (below) summarises the potential flood sources and the related flood risk posed to the Site by the various sources.

Table 3: Sources of Flood Risk

Flood Source	Presence at site	Potential risk at site	Description
Tidal	No	N/A	Site is not affected by tidal water.
Fluvial	Yes	Low	The Site is shown to be within Flood Zone 1 and therefore at a low risk of fluvial flooding. The diverted brook is designed to have capacity for the 1 in 100 year plus climate change and therefore is at a low risk of flood risk. It is considered that the development proposal's design can mitigate any perceived risks to the Site or from the diverted watercourse.

Table 3: Sources of Flood Risk			
Flood Source	**Presence at site**	**Potential risk at site**	**Description**
Pluvial/Overland Flow	Yes	Low	There are limited areas of higher land close to the Site which will discharge directly onto the Site. There is some surface water ponding over the Site shown on available flood mapping however, this originates on the Site itself and is not shown as a flood route. The restored Risley Landfill surface water management system lies to the west of the site. Failure of this drainage system is noted to direct surface water to the south west and generally away from the Site. Overall it is considered that pluvial/overland flood risk is low and that the development proposal's design can mitigate any perceived risks.
Groundwater	Yes	Low	Available ground condition information indicates that the site is underlain with clay and peat. The peat area is to be treated/removed in the development area thereby removing ground water risk. Available site information shows groundwater at a typical depth of 3m and noted some locally wet areas over part of the Site, but these are considered to be perched water rather than a ground water flow to surface. The development proposal is to nominally raise the Site and install a positive drainage system. It is considered this will provide mitigation for any perceived risk. On this basis, it is considered that groundwater flood risk is low.
Sewers	No	N/A	There are no public sewers close to or on the Site on this basis it is concluded that there is no sewer flood risk.
Artificial Sources	No	N/A	The EA records show no risk of flooding from any reservoir breach and there are no other known artificial sources affecting the Site. On this basis it is considered that there is no flood risk from this source.

Tidal Flooding

4.1.3 The Site is not located in an area at risk of tidal flooding or within proximity of the tidal reach of a watercourse.

Fluvial Flooding

4.1.4 The Site is shown to be within Flood Zone 1 and therefore at a low risk of fluvial flooding.

4.1.5 The Silver Lane Brook to the west which is being diverted around the eastern boundary of the Site is not shown to flood on the Government's flood mapping. The flow in this watercourse is from the restored landfill site to the west and this flow is restricted by the landfill surface water management system. The design of the watercourse diversion includes for this design flow and therefore is considered to be a low flood risk source.

4.1.6 The unnamed watercourse to the east has a limited catchment and is not shown to be at risk of flooding on the Government's flood mapping. The watercourse falls from north to south and if it did flood then water would be directed away from the development and to the north therefore would not cause flooding of the Site.

4.1.7 There are watercourses/ditches and ponds to the western restored Risley Landfill site which drain to two outfalls to the Silver Lane Brook. This drainage system is designed for a 1 in 100 year event with an allowance of 10% climate change. It is noted that should the landfill site drainage system flood then the majority of flows would be expected to discharge to the south west. Some flows could potentially be directed to the western boundary of the site but the falls along this edge will direct water to the north. Consideration of the western boundary will be undertaken at the Reserve Matters stage to ensure any exceedance flows are directed away from the Site as currently occurs.

4.1.8 Biffa are currently assessing improvements to the surface water management of the restored landfill site and these are aimed at reducing surface water discharge and catchment area to pond 6 and also improving surface water storage to provide an additional allowance for climate change. If these proposals are implemented, then a further reduction in the risk of flooding from this source will be provided. If however, these improvements are not completed then it is still considered that fluvial flood risk will remain low.

4.1.9 Overall it is considered that the Site is at a low risk of fluvial flooding and the development proposals will be able to mitigate for any perceived risks.

Pluvial/Overland Flow

4.1.10 Where adjacent land is either impermeable or where the ground infiltration capacity is exceeded there is a risk that surface water runoff can develop and flow over the ground. If this land falls towards a new development there is a risk that surface water flooding could occur.

4.1.11 There are limited areas of higher land close to the Site which will discharge directly onto the Site. The available flood mapping indicates that there is a risk of some surface water ponding however, this originates from the Site itself and is not an off-site flood route.

4.1.12 The land to the south, north and north west all fall away from the Site.

4.1.13 As noted in the fluvial flood risk section, there are watercourses/ditches and ponds to the western restored Risley Landfill site and the risk of flooding to the Site is considered limited. Boundary treatment to the west will be undertaken at the Reserve Matters stage to ensure any exceedance flows are directed away from the Site as currently occurs.

4.1.14 The Biffa assessment on improving the surface water management of the restored landfill site noted in the fluvial flood risk section will also further reduce the pluvial flood risk if implemented.

4.1.15 Overall it is considered that pluvial/overland flood risk is low and the development proposals will be able to mitigate any perceived risks.

Groundwater Flooding

4.1.16 Groundwater flooding can occur anywhere where groundwater levels rise above the ground level.

4.1.17 Available ground condition information indicates that the site is underlain with clay and peat. Groundwater was identified at a typical depth of 3m from the limited available site investigation information. There were some noted wet areas over part of the Site, but these appear to be perched water rather than a ground water flow to surface. It is proposed that the peat within the development will be treated/removed and this will remove groundwater flood risk from this source.

4.1.18 The development proposal is to raise the Site and install a positive drainage system. It is considered that this will provide mitigation for any perceived risk.

4.1.19 On this basis, it is considered that groundwater flood risk is low.

4.1.20 The design will be finalised following completion of a full site investigation at the Reserve Matters stage. If groundwater flooding is considered to be a risk then appropriate mitigation will be completed.

Sewers

4.1.21 Flooding from sewers can occur during extreme rainfall events that exceed the design capacity of the sewer system.

4.1.22 There are no private or public sewers close to or crossing the Site and therefore it is concluded that there is no sewer flood risk.

Artificial Sources

4.1.23 The Environment Agency mapping shows no risk from reservoir breach and there are no other artificial waterbodies close to the Site. On this basis there is no perceived flood risk from artificial sources to the Site.

4.2 Flood Risk – from the Development

4.2.1 On sites where there is an increase in impermeable area, or development within the flood zone, there is always the potential to increase the risk of flooding because of the development. With the proposed surface water management strategy, it is considered that there is an overall reduction in on and off-site flood risk achieved by reducing existing surface water discharge and providing surface water storage.

Floodplain Storage

4.2.2 The Site is located wholly in Flood Zone 1 and therefore there is no impact on any floodplain.

Flood Flow Routes

4.2.3 The design of the drainage system provides protection for storm events up to and including the 1 in 100 year plus climate change. Any excess flows above this level of protection will be directed to non-essential/sacrificial areas of the site.

Floor Levels and Safe Access/Egress

4.2.4 It is considered that as the Site is located wholly in Flood Zone 1 then the requirements for safe access and egress are met.

4.3 Climate Change

4.3.1 In assessing the potential flood risk at the Site over the lifetime of the development climate change has been considered.

4.3.2 The Environment Agency has reviewed the climate change allowances to be considered in conjunction with the planning process in England and have published new guidance as of February 2016 and updated February 2019.

4.3.3 It is considered that a design life of under 40 years would be a reasonable allowance for the development.

4.3.4 The Site is not affected by fluvial or coastal flooding and therefore climate change allowance related to these sources are not applicable.

4.3.5 Flows from the restored landfill site, which is the source of the diverted Silver Lane Brook, includes a 40 % climate change allowance. This is considered to be a sufficient climate change allowance for the diversion design.

4.3.6 The guidance considers climate change relating to peak rainfall intensity and recommends that both the central and upper end allowances should be considered to understand the range of impact.

4.3.7 Table 4 (below) shows anticipated changes in extreme rainfall intensity in small and urban catchments.

Table 4: Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)			
Applies Across all of England	**Total potential change anticipated for 2010-2039**	**Total potential change anticipated for 2040-2059**	**Total potential change anticipated for 2060-2115**
Upper end	+10%	+20%	+40%
Central	+5%	+10%	+20%

4.3.8 At this stage, it is considered that a climate change allowance of 20% on peak rainfall intensity would apply to the development and this has been used in the surface water storage design.

5 RESIDUAL RISKS

5.1.1 There is always a possibility of a flood in excess of that allowed for which might conceivably cause some flooding to the development. However, such an event would have a very low probability and the risk of flooding to development would be extremely small.

5.1.2 It is therefore considered that the residual risks associated with flooding are within current guidelines.

6 CONCLUSIONS

6.1.1 This report gives details of the Flood Risk Assessment, which has been carried out on behalf of Extra MSA Group, to support the Outline Planning Application and Environmental Statement for the proposed Motorway Services Area on land to the north east of Junction 11 of the M62 Motorway.

6.1.2 This report should be read in conjunction with the Environmental Statement for the proposals, with specific reference to Part 2 documents titled '*Geology and Ground Conditions Technical Papers No 7*', '*Water Resources Technical Paper No 3*' and '*Agricultural Land and Soils Technical Paper No 16*'.

6.1.3 The Site is located in Flood Zone 1 and the Sequential and Exception Tests are not applicable.

6.1.4 It is concluded that the Outline Planning Application proposal has no flood risk from tidal, sewer or artificial sources and a low risk of flooding from fluvial, pluvial/overland and groundwater sources. It is also considered that any residual flooding can be mitigated.

6.1.5 A surface water management strategy for the Site has been considered and it is concluded that a surface water drainage system, with storage, for the Site can be provided which ensures no increase in flood risk on or off the Site. The surface water management strategy also provides a reduction in the surface water runoff from the existing land thereby reducing flood impacts to the surrounding area.

6.1.6 The proposals also include a separate foul water drainage system which will collect and discharge foul flows to the United Utilities' public sewer system within Leacroft Road. This ensure that any foul water from the development is satisfactorily dealt with.

6.1.7 It is also concluded that the diversion of the Silver Lane Brook around the eastern boundary of the site is feasible and can be completed without causing adverse effects on flood risk on or off the Site.

6.1.8 There are no local site-specific risks that would adversely affect the Flood Zone categorisation. Similarly, there are considered to be no significant increased off-site flooding risks as a result of the development. The Site is therefore considered suitable, in terms of flood risk, for the types of development proposed.

6.1.9 At the next stage, the outline drainage design will be finalised following completion of the site investigation and agreement of the layout design.

ANNEX 1
Flood Map for Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
WarringtonMSA	**367046/393614**	**15 Apr 2019 11:00**

Your selected location is in flood zone 1, an area with a low probability of flooding.

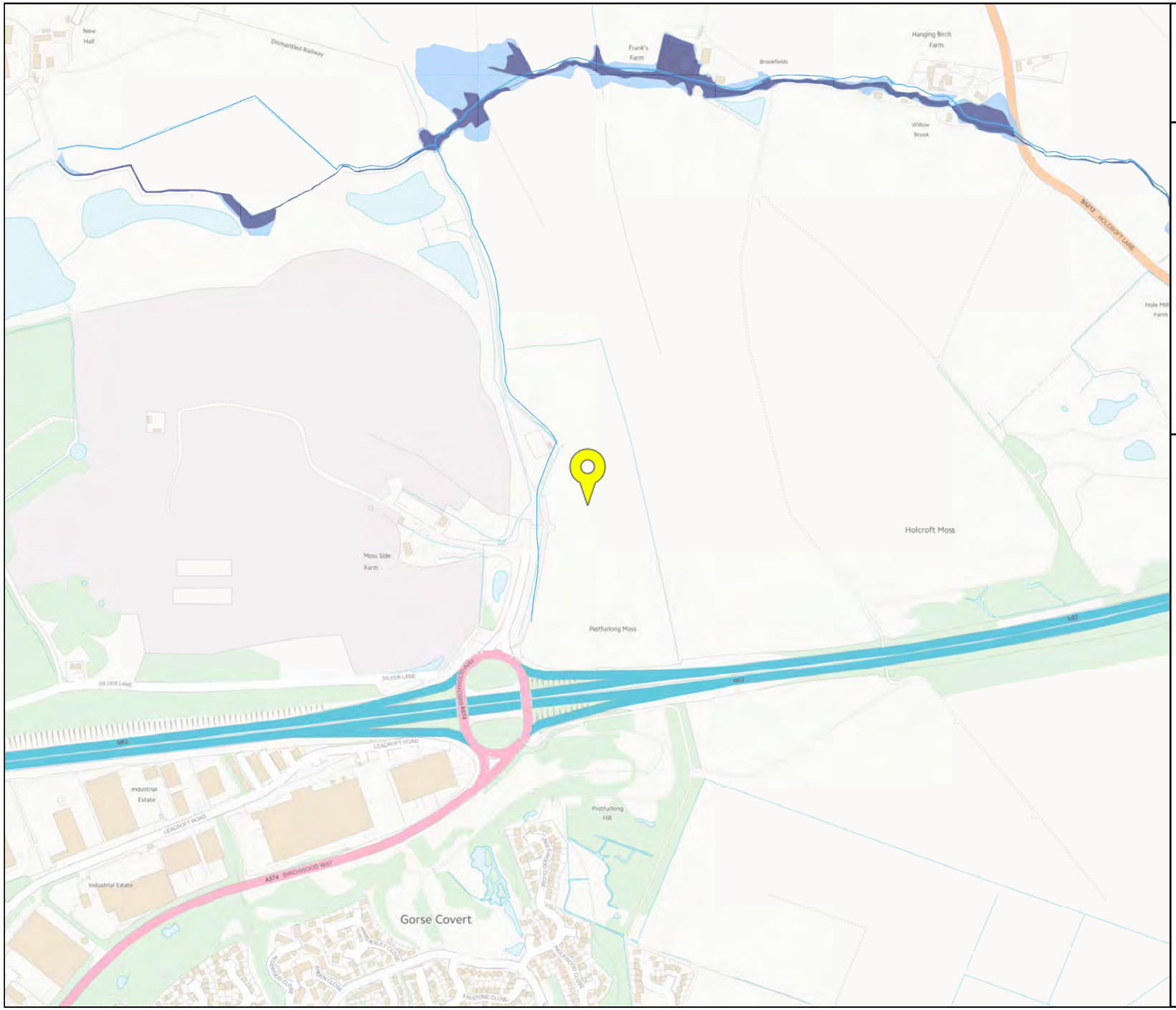
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
WarringtonMSA

Location (easting/northing)
367046/393614

Scale
1:10000

Created
15 Apr 2019 11:00

- Selected point
- Flood zone 3
- Flood zone 3: areas benefittin from floo defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 100 200 300m

ANNEX 2
Risley Landfill Surface Water Plan

PHOTOGRAPH 6 : DRAIN CONFLUENCE PRONE TO SURCHARGING

PHOTOGRAPH 7 : TYPICAL DITCH ARRANGEMENT ON CAPPED LANDFILL DOME

PHOTOGRAPH 8 : VIEW OF PONDS 1, 2 AND 4 FROM CAPPED LANDFILL

PHOTOGRAPH 9 : STANDING WATER IN DITCH WITH INSUFFICIENT GRADIENT

PHOTOGRAPH 10 : TRACKSIDE DITCHES IN SOUTHWEST CORNER OF SITE

PHOTOGRAPH 5 : DITCH ALONG EASTERN SITE BOUNDARY WITH PUMPING CHAMBER FOR OUTFLOW

PHOTOGRAPH 10 : TRACKSIDE DITCHES IN SOUTHWEST CORNER OF SITE

PHOTOGRAPH 13 : VIEW TOWARDS POND 2 FROM TRACK UPSLOPE OF CONFLUENCE PRONE TO SURCHARGING

PHOTOGRAPH 14 : VIEW OF TRACKSIDE DITCH UP-GRADIENT OF ROAD WITH INSUFFICIENT FALL

PHOTOGRAPH 11 : DITCHES AT COMPOUND PRONE TO SURCHARGING

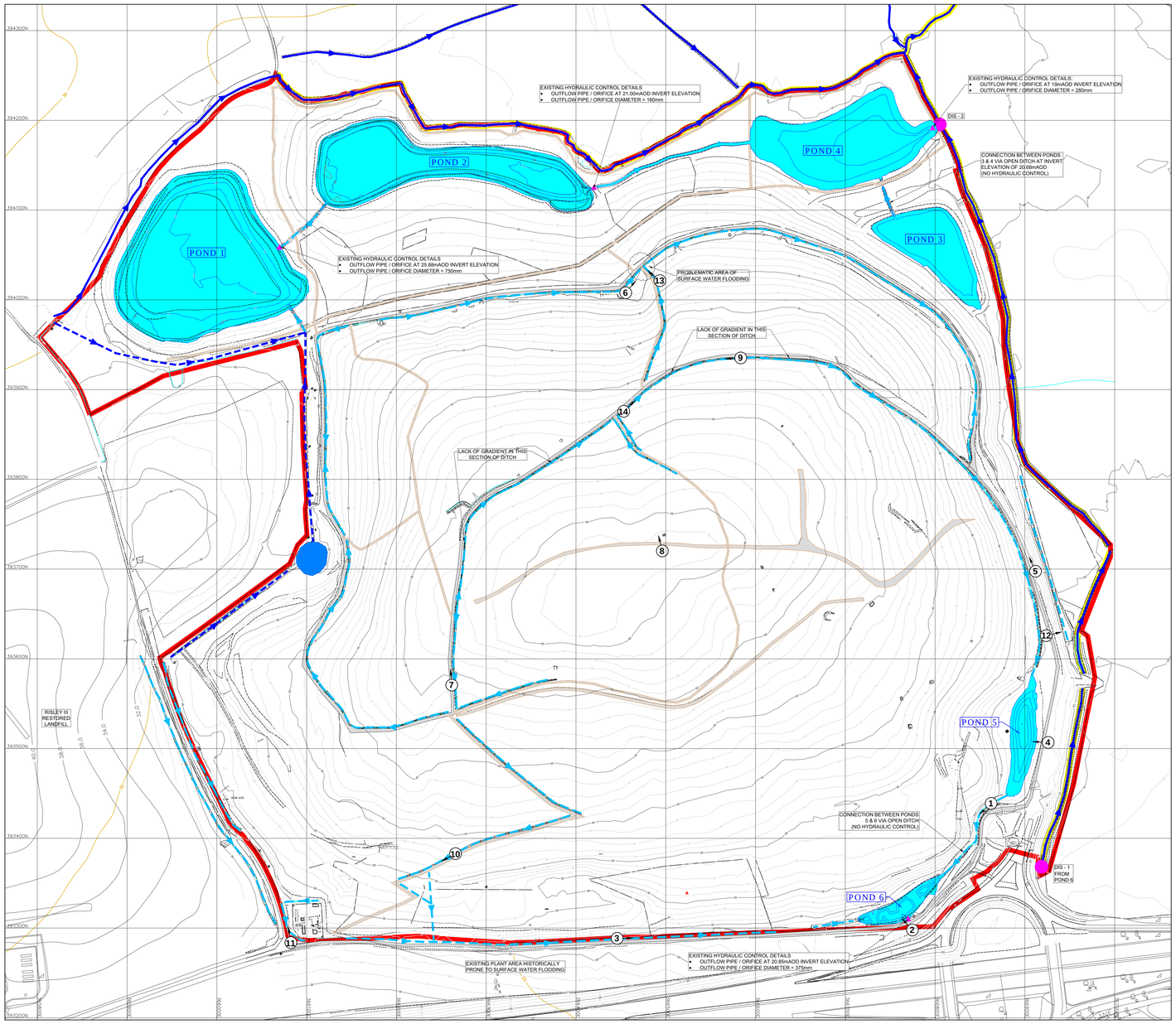
PHOTOGRAPH 12 : PUMPING CHAMBER IN DITCH ALONG EASTERN SITE BOUNDARY

PHOTOGRAPH 1 : DITCH BETWEEN POND 5 AND POND 6

PHOTOGRAPH 2 : POND 6 FROM ADJACENT TRACK

PHOTOGRAPH 3 : TRACKSIDE DITCH ALONG SOUTHERN SITE BOUNDARY

PHOTOGRAPH 4 : POND 5 FROM ADJACENT WALKWAY



NOTES

1. SURVEY INFORMATION TAKEN FROM BIFFA DRAWING "OPERATIONAL SITE SURVEY", DATED 8th NOVEMBER 2015.

LEGEND

- SITE BOUNDARY
- EXISTING CONSENTED SURFACE WATER DISCHARGE LOCATIONS
- EXISTING SURFACE WATER MANAGEMENT PONDS
- EXISTING PRINCIPAL SURFACE WATER DITCHES / SWALES
- SURVEYED PRINCIPAL CONTOURS
- APPROXIMATE EXTENT OF EXISTING PUBLIC BRIDLEWAYS / FOOTPATHS (NOT ALL MAY BE SHOWN)
- PHOTOGRAPH LOCATION, ID AND DIRECTION
- WILLOW BROOK (ORDINARY WATERCOURSE)
- WILLOW BROOK (EA MAIN RIVER)
- OTHER EXISTING WATER COURSE
- POND OUTFLOW HYDRAULIC CONTROL

N

REV	DATE	DRAWN	DESCRIPTION
0	12/16	IG	

SLR global environmental solutions

Biffa Waste Services Ltd
Poplars Landfill Site
Lichfield Road
Cannock
WS11 8NQ
Tel: 01543 577899
Mob: 07834 092155
e-mail michelle.saunders@biffa.co.uk

PROJECT	Surface Water Management Plan	DRAWN	IG
LOCATION	Risley Landfill Site	DATE	12/16
DRAWING TITLE	Existing Site Layout / Overview	SCALE(S)	1:2,000
DRAWING No.	RIS - 2	COMPUTER REF.	

0 20 40 60 80m 120 160 200
Metres 1:2000

ANNEX 3
IH124 Greenfield Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.411
Area (ha)	8.700	Urban	0.000
SAAR (mm)	862	Region Number	Region 10

Results l/s

QBAR Rural	40.1
QBAR Urban	40.1
Q2 years	37.3
Q1 year	34.8
Q30 years	67.9
Q100 years	83.3

ANNEX 4
Estimated Attenuation Calculations

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	19.851	0.351	40.1	754.8	O K
30 min Summer	19.959	0.459	40.1	986.6	O K
60 min Summer	20.066	0.566	40.1	1216.3	O K
120 min Summer	20.160	0.660	40.1	1419.7	O K
180 min Summer	20.201	0.701	40.1	1507.0	O K
240 min Summer	20.218	0.718	40.1	1543.3	O K
360 min Summer	20.220	0.720	40.1	1548.9	O K
480 min Summer	20.216	0.716	40.1	1538.7	O K
600 min Summer	20.206	0.706	40.1	1518.6	O K
720 min Summer	20.194	0.694	40.1	1492.3	O K
960 min Summer	20.164	0.664	40.1	1428.6	O K
1440 min Summer	20.098	0.598	40.1	1286.4	O K
2160 min Summer	20.001	0.501	40.1	1078.0	O K
2880 min Summer	19.916	0.416	40.1	893.7	O K
4320 min Summer	19.786	0.286	40.1	613.8	O K
5760 min Summer	19.709	0.209	40.1	449.7	O K
7200 min Summer	19.679	0.179	35.9	385.7	O K
8640 min Summer	19.659	0.159	31.9	342.0	O K
10080 min Summer	19.644	0.144	28.8	308.7	O K
15 min Winter	19.895	0.395	40.1	848.6	O K
30 min Winter	20.017	0.517	40.1	1110.9	O K
60 min Winter	20.139	0.639	40.1	1373.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	66.113	0.0	792.3	31
30 min Summer	43.674	0.0	1047.1	45
60 min Summer	27.653	0.0	1326.3	74
120 min Summer	17.024	0.0	1633.2	132
180 min Summer	12.689	0.0	1826.1	190
240 min Summer	10.257	0.0	1968.3	246
360 min Summer	7.553	0.0	2174.2	320
480 min Summer	6.080	0.0	2333.8	384
600 min Summer	5.135	0.0	2463.8	446
720 min Summer	4.472	0.0	2574.5	514
960 min Summer	3.592	0.0	2757.6	650
1440 min Summer	2.635	0.0	3034.3	922
2160 min Summer	1.930	0.0	3334.4	1312
2880 min Summer	1.547	0.0	3562.4	1684
4320 min Summer	1.131	0.0	3906.5	2388
5760 min Summer	0.905	0.0	4167.5	3016
7200 min Summer	0.761	0.0	4380.1	3752
8640 min Summer	0.660	0.0	4560.6	4424
10080 min Summer	0.585	0.0	4718.1	5152
15 min Winter	66.113	0.0	887.5	31
30 min Winter	43.674	0.0	1172.9	45
60 min Winter	27.653	0.0	1485.6	74

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
120 min Winter	20.250	0.750	40.1	1612.3	O K
180 min Winter	20.301	0.801	40.1	1721.3	O K
240 min Winter	20.325	0.825	40.1	1773.3	O K
360 min Winter	20.333	0.833	40.1	1791.8	O K
480 min Winter	20.321	0.821	40.1	1765.4	O K
600 min Winter	20.307	0.807	40.1	1736.1	O K
720 min Winter	20.289	0.789	40.1	1697.4	O K
960 min Winter	20.245	0.745	40.1	1600.8	O K
1440 min Winter	20.142	0.642	40.1	1379.5	O K
2160 min Winter	19.991	0.491	40.1	1054.8	O K
2880 min Winter	19.862	0.362	40.1	777.4	O K
4320 min Winter	19.702	0.202	40.1	434.2	O K
5760 min Winter	19.664	0.164	32.9	353.6	O K
7200 min Winter	19.640	0.140	28.0	300.6	O K
8640 min Winter	19.622	0.122	24.5	262.4	O K
10080 min Winter	19.609	0.109	21.8	233.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
120 min Winter	17.024	0.0	1829.3	130
180 min Winter	12.689	0.0	2045.4	186
240 min Winter	10.257	0.0	2204.7	244
360 min Winter	7.553	0.0	2435.2	352
480 min Winter	6.080	0.0	2614.0	442
600 min Winter	5.135	0.0	2759.6	480
720 min Winter	4.472	0.0	2883.6	556
960 min Winter	3.592	0.0	3088.6	708
1440 min Winter	2.635	0.0	3398.6	1002
2160 min Winter	1.930	0.0	3734.7	1400
2880 min Winter	1.547	0.0	3991.1	1768
4320 min Winter	1.131	0.0	4375.4	2340
5760 min Winter	0.905	0.0	4667.7	3056
7200 min Winter	0.761	0.0	4905.8	3760
8640 min Winter	0.660	0.0	5108.0	4496
10080 min Winter	0.585	0.0	5284.5	5168

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.368	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 6.400

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.000	8	12	2.000	16	20	0.400
4	8	1.000	12	16	3.000			

Model Details

Storage is Online Cover Level (m) 22.000

Tank or Pond Structure

Invert Level (m) 19.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2150.0	1.500	2150.0	1.510	0.0

Pump Outflow Control

Invert Level (m) 19.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	40.1000	1.800	40.1000	3.400	40.1000	5.000	40.1000
0.400	40.1000	2.000	40.1000	3.600	40.1000	5.200	40.1000
0.600	40.1000	2.200	40.1000	3.800	40.1000	5.400	40.1000
0.800	40.1000	2.400	40.1000	4.000	40.1000	5.600	40.1000
1.000	40.1000	2.600	40.1000	4.200	40.1000	5.800	40.1000
1.200	40.1000	2.800	40.1000	4.400	40.1000	6.000	40.1000
1.400	40.1000	3.000	40.1000	4.600	40.1000		
1.600	40.1000	3.200	40.1000	4.800	40.1000		

Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	20.051	0.551	40.1	1185.7	O K
30 min Summer	20.231	0.731	40.1	1571.7	O K
60 min Summer	20.415	0.915	40.1	1967.9	O K
120 min Summer	20.590	1.090	40.1	2343.0	O K
180 min Summer	20.675	1.175	40.1	2526.5	O K
240 min Summer	20.721	1.221	40.1	2625.3	O K
360 min Summer	20.753	1.253	40.1	2693.3	O K
480 min Summer	20.754	1.254	40.1	2697.0	O K
600 min Summer	20.741	1.241	40.1	2668.6	O K
720 min Summer	20.726	1.226	40.1	2636.0	O K
960 min Summer	20.691	1.191	40.1	2559.8	O K
1440 min Summer	20.612	1.112	40.1	2391.1	O K
2160 min Summer	20.491	0.991	40.1	2130.5	O K
2880 min Summer	20.375	0.875	40.1	1880.8	O K
4320 min Summer	20.167	0.667	40.1	1434.4	O K
5760 min Summer	19.997	0.497	40.1	1068.1	O K
7200 min Summer	19.867	0.367	40.1	788.0	O K
8640 min Summer	19.774	0.274	40.1	588.4	O K
10080 min Summer	19.715	0.215	40.1	462.8	O K
15 min Winter	20.119	0.619	40.1	1331.9	O K
30 min Winter	20.322	0.822	40.1	1767.6	O K
60 min Winter	20.531	1.031	40.1	2217.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	102.454	0.0	1228.4	31
30 min Summer	68.339	0.0	1637.6	45
60 min Summer	43.553	0.0	2089.5	74
120 min Summer	26.871	0.0	2578.5	134
180 min Summer	19.999	0.0	2879.9	192
240 min Summer	16.123	0.0	3095.7	252
360 min Summer	11.793	0.0	3396.5	368
480 min Summer	9.456	0.0	3630.0	484
600 min Summer	7.959	0.0	3820.2	542
720 min Summer	6.911	0.0	3980.0	602
960 min Summer	5.525	0.0	4242.3	724
1440 min Summer	4.024	0.0	4630.5	992
2160 min Summer	2.925	0.0	5053.1	1396
2880 min Summer	2.330	0.0	5366.7	1796
4320 min Summer	1.688	0.0	5832.6	2560
5760 min Summer	1.341	0.0	6180.3	3288
7200 min Summer	1.122	0.0	6460.0	3968
8640 min Summer	0.969	0.0	6695.2	4592
10080 min Summer	0.856	0.0	6898.6	5248
15 min Winter	102.454	0.0	1375.6	31
30 min Winter	68.339	0.0	1833.0	45
60 min Winter	43.553	0.0	2340.3	74

Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
120 min Winter	20.733	1.233	40.1	2651.1	O K
180 min Winter	20.835	1.335	40.1	2871.0	O K
240 min Winter	20.893	1.393	40.1	2995.7	O K
360 min Winter	20.942	1.442	40.1	3099.5	O K
480 min Winter	20.956	1.456	40.1	3130.9	O K
600 min Winter	20.949	1.449	40.1	3115.5	O K
720 min Winter	20.929	1.429	40.1	3072.3	O K
960 min Winter	20.877	1.377	40.1	2961.1	O K
1440 min Winter	20.769	1.269	40.1	2728.8	O K
2160 min Winter	20.588	1.088	40.1	2338.3	O K
2880 min Winter	20.409	0.909	40.1	1954.9	O K
4320 min Winter	20.094	0.594	40.1	1277.8	O K
5760 min Winter	19.855	0.355	40.1	762.3	O K
7200 min Winter	19.712	0.212	40.1	455.8	O K
8640 min Winter	19.679	0.179	35.9	385.3	O K
10080 min Winter	19.659	0.159	31.8	341.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
120 min Winter	26.871	0.0	2889.1	132
180 min Winter	19.999	0.0	3225.4	190
240 min Winter	16.123	0.0	3467.2	246
360 min Winter	11.793	0.0	3804.0	362
480 min Winter	9.456	0.0	4066.4	474
600 min Winter	7.959	0.0	4278.1	582
720 min Winter	6.911	0.0	4457.1	686
960 min Winter	5.525	0.0	4749.6	776
1440 min Winter	4.024	0.0	5177.8	1078
2160 min Winter	2.925	0.0	5660.6	1524
2880 min Winter	2.330	0.0	6010.8	1944
4320 min Winter	1.688	0.0	6533.6	2696
5760 min Winter	1.341	0.0	6923.1	3352
7200 min Winter	1.122	0.0	7235.4	3832
8640 min Winter	0.969	0.0	7498.7	4496
10080 min Winter	0.856	0.0	7726.6	5248

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.368	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time Area Diagram

Total Area (ha) 6.400

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.000	8	12	2.000	16	20	0.400
4	8	1.000	12	16	3.000			

Model Details

Storage is Online Cover Level (m) 22.000

Tank or Pond Structure

Invert Level (m) 19.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2150.0	1.500	2150.0	1.510	0.0

Pump Outflow Control

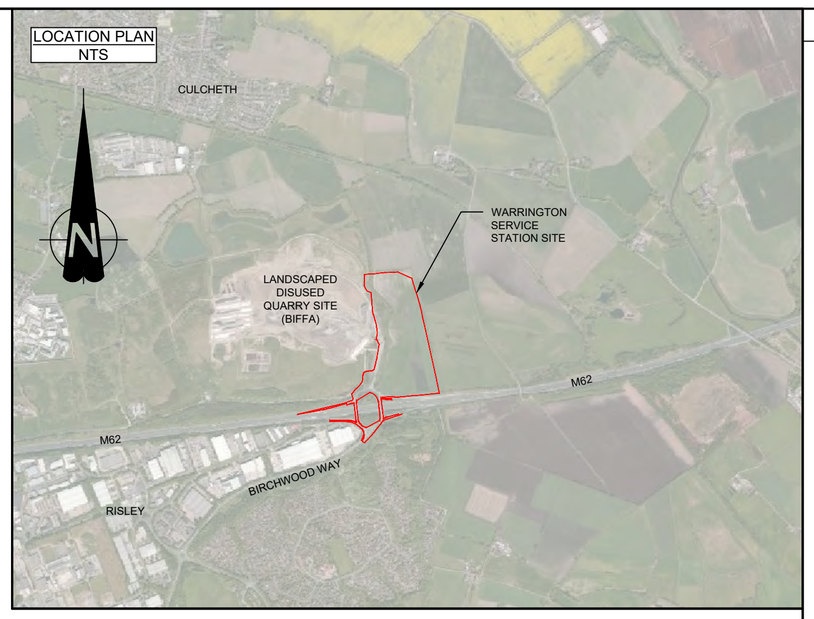
Invert Level (m) 19.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	40.1000	1.800	40.1000	3.400	40.1000	5.000	40.1000
0.400	40.1000	2.000	40.1000	3.600	40.1000	5.200	40.1000
0.600	40.1000	2.200	40.1000	3.800	40.1000	5.400	40.1000
0.800	40.1000	2.400	40.1000	4.000	40.1000	5.600	40.1000
1.000	40.1000	2.600	40.1000	4.200	40.1000	5.800	40.1000
1.200	40.1000	2.800	40.1000	4.400	40.1000	6.000	40.1000
1.400	40.1000	3.000	40.1000	4.600	40.1000		
1.600	40.1000	3.200	40.1000	4.800	40.1000		

DRAWINGS

SITE PLAN
SCALE 1:1000

LOCATION PLAN
NTS



APPROX. ROUTE OF CULVERTED WATERCOURSE BASED ON OS DATA

300mm Ø OUTLET

BIFFA RESTORED LANDFILL SITE

AGRICULTURAL FIELDS

EXISTING SILVER LANE BROOK

POND FROM ADJACENT SITE DISCHARGES TO SILVER LANE BROOK

900mm Ø INLET

300mm Ø INLET

M62 SLIP ROAD / MOTORWAY

DO NOT SCALE FROM THIS DRAWING

LEGEND

- KNOWN WATERCOURSE ROUTE
- ASSUMED WATERCOURSE ROUTE
- INDICATIVE LAND FALL SLOPE DIRECTION

NOTES

1. FOR PLANNING PURPOSES ONLY AND TO BE READ IN CONJUNCTION WITH WARDELL ARMSTRONG FLOOD RISK ASSESSMENT REFERENCE APPENDIX 9.1.
2. ALL LEVELS SHOWN ARE IN METRES AND ARE RELATIVE TO ORDNANCE DATUM (mAOD).
3. EXISTING SITE LEVELS SHOWN ARE BASED ON TOPOGRAPHICAL SURVEY.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
A	PLANNING ISSUE. RED LINE BOUNDARY ADDED.	06.08.19	MB	JS	JS

CLIENT

EXTRA MSA GROUP

PROJECT

MOTORWAY SERVICES, WARRINGTON

DRAWING TITLE

SITE LOCATION, TOPOGRAPHY AND EXISTING DRAINAGE PLAN

DRG No.	REV
SH11739-001	A
DRG SIZE: A1	SCALE: 1:1000
DRAWN BY: MB	CHECKED BY: JS
DATE: 16/05/19	APPROVED BY: JS

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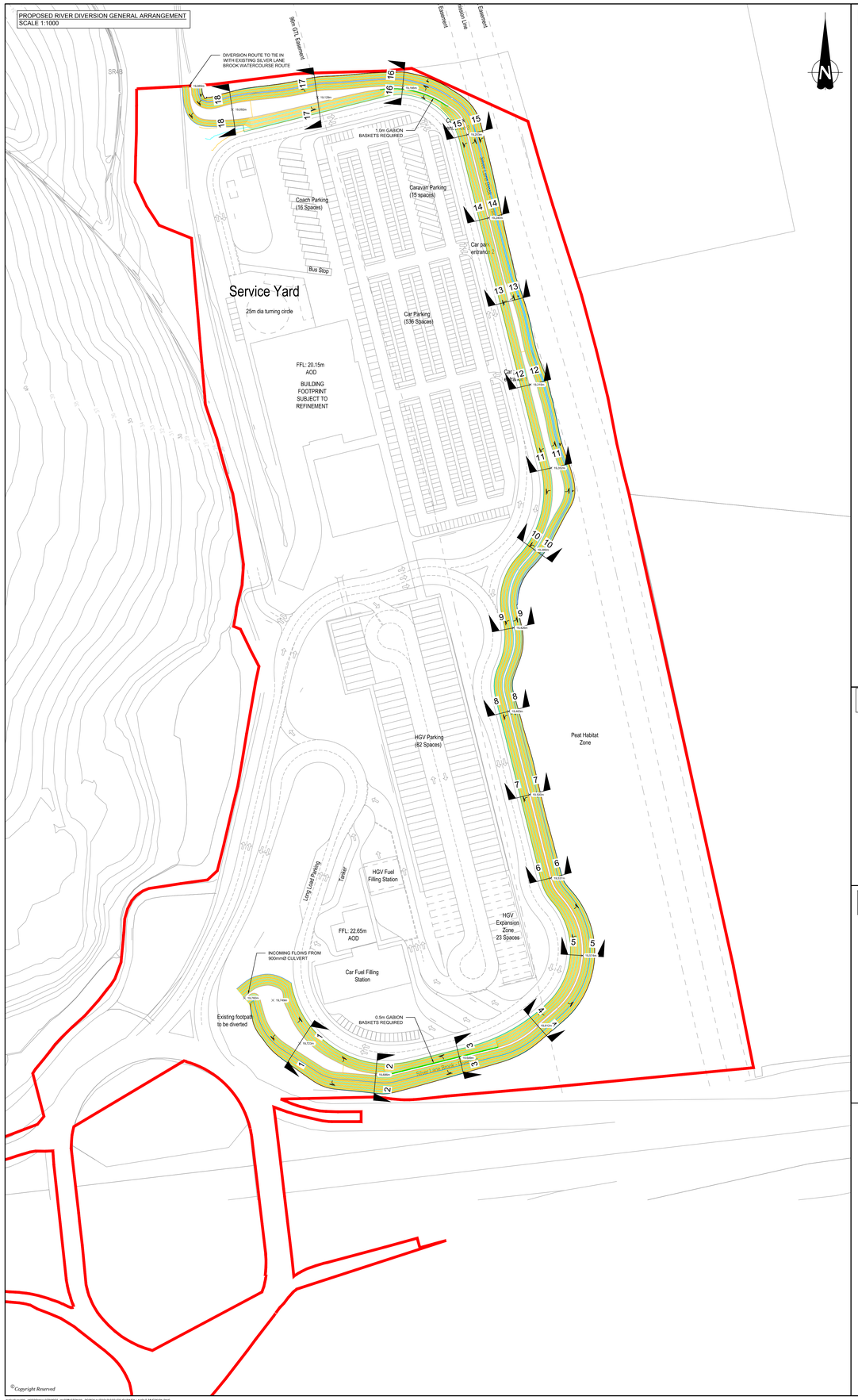
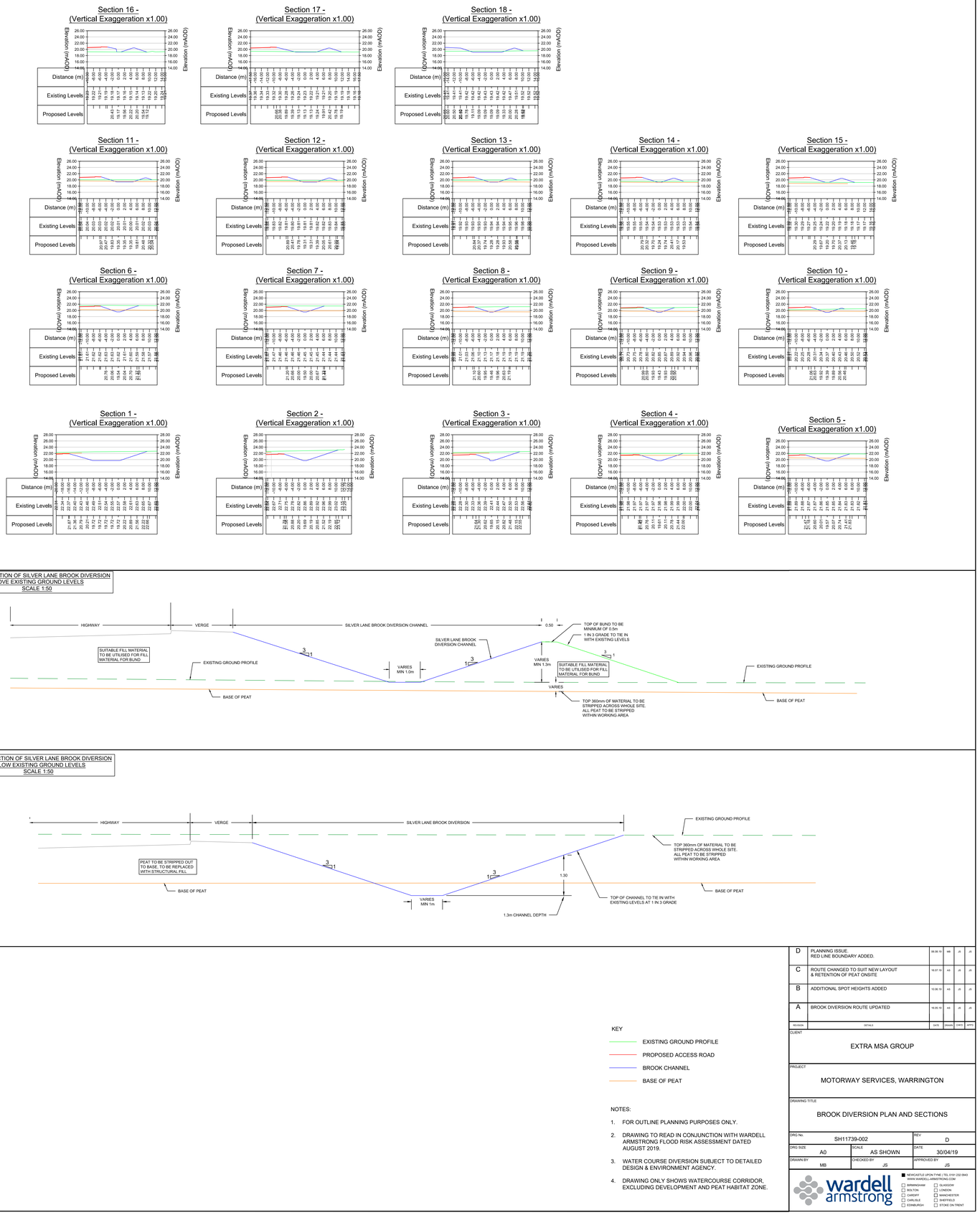
PROPOSED RIVER DIVERSION GENERAL ARRANGEMENT
SCALE 1:1000



DO NOT SCALE FROM THIS DRAWING

CROSS SECTIONS
SCALE 1:500



TYPICAL SECTION OF SILVER LANE BROOK DIVERSION ABOVE EXISTING GROUND LEVELS
SCALE 1:50

TYPICAL SECTION OF SILVER LANE BROOK DIVERSION BELOW EXISTING GROUND LEVELS
SCALE 1:50

KEY

- EXISTING GROUND PROFILE
- PROPOSED ACCESS ROAD
- BROOK CHANNEL
- BASE OF PEAT

NOTES:

1. FOR OUTLINE PLANNING PURPOSES ONLY.
2. DRAWING TO READ IN CONJUNCTION WITH WARDELL ARMSTRONG FLOOD RISK ASSESSMENT DATED AUGUST 2019.
3. WATER COURSE DIVERSION SUBJECT TO DETAILED DESIGN & ENVIRONMENT AGENCY.
4. DRAWING ONLY SHOWS WATERCOURSE CORRIDOR, EXCLUDING DEVELOPMENT AND PEAT HABITAT ZONE.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD
D	PLANNING ISSUE. RED LINE BOUNDARY ADDED.	04.06.19	MB	JS	JS
C	ROUTE CHANGED TO SUIT NEW LAYOUT & RETENTION OF PEAT ONSITE	16.07.19	AS	JS	JS
B	ADDITIONAL SPOT HEIGHTS ADDED	15.08.19	AS	JS	JS
A	BROOK DIVERSION ROUTE UPDATED	16.09.19	AS	JS	JS

CLIENT
EXTRA MSA GROUP

PROJECT
MOTORWAY SERVICES, WARRINGTON

DRAWING TITLE
BROOK DIVERSION PLAN AND SECTIONS

DRG No. SH11739-002		REV D	
DRG SIZE A0	SCALE AS SHOWN	DATE 30/04/19	
DRAWN BY MB	CHECKED BY JS	APPROVED BY JS	

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N:\SH\SH11739 - MOTORWAY SERVICES, WARRINGTON\03 - DESIGN\AUTOCAD\SCRATCH\PHZ\NEW LAYOUT\DRDESIGN.DWG

Rev:	Date:	Description:	By:	Rvw:
P9	26.07.19	Outline Planning Issue	JLR	TW
P8	25.07.19	FFL's updated	JLR	TW
P7	19.07.19	Building plan updated. Additional colour and detail attached	JLR	TW
P6	16.07.19	Site plan updated in accordace with comments from highway engineer	JLR	TW
P5	11.07.19	New site layout to incorporate peat habitat zone	JLR	TW
P4	22.05.19	Planning Draft For Review	TW	NAB
P3	02.05.19	Play area moved in line with HSE comments. Parking adjusted to accomodate revised play area. Bus stop added following public consultation in line with Extra instruction. Pedestrian link from car parking to PROW added in line with Spawforths comments.	TW	TW
P2	11.04.19	Context coordination. FFS update	JLR	TW
P1	20.03.19	i-Transpoty access plan added, amenity building updated	TW	TW

architecture 519
a. The Studio, Candle House, 1 Wharf Approach, Granary Wharf, Leeds, LS1 4GH
e. Leeds@architecture519.com
w. www.architecture519.com
t. 0113 213 5656

Client:
EXTRA MSA GROUP

Project No: 2562

Project Name: WARRINGTON MOTORWAY SERVICE AREA, J11 M62

Document Reference:
Project - Originator - Volume - Level - Type - Role - Number
RMS - 519 - ZZ - XX - DR - A - 0751

INDICATIVE SITE PLAN

Status: Code: Suitability description

Revision: Code: P9 Revision status: Planning

Created By:	Reviewed By:	Date:	Scale at A1:
JLR	TW	01.04.19	1 : 1250

DO NOT SCALE FROM THIS DRAWING

LEGEND

- CRATE / TANK STORAGE
- MAIN PROPOSED SURFACE WATER DRAINAGE
- PROPOSED BROOK DIVERSION
- SURFACE WATER PUMPING STATION
- SWALE AND FILTER DRAIN SuDS
- DRAINAGE CHANNEL SuDs
- KERB DRAIN SuDS
- MAIN PROPOSED FOUL DRAINAGE
- MAIN PROPOSED FOUL RISING MAIN

NOTES

1. FOR PLANNING PURPOSES ONLY AND TO BE READ IN CONJUNCTION WITH WARDELL ARMSTRONG FLOOD RISK DATED AUGUST 2019.
2. ALL LEVELS SHOWN ARE IN METRES AND ARE RELATIVE TO ORDNANCE DATUM (mAOD).
3. DRAINAGE SHOWN IS PRELIMINARY ONLY AND SUBJECT TO DETAIL DESIGN.
4. ONLY MAIN SURFACE WATER DRAINAGE RUNS SHOWN. ROAD, PARKING, BUILDING DRAINAGE NOT SHOWN.
5. DISCHARGE IS LIMITED TO GREENFIELD RUN OFF BASED UPON 8.7 Ha GIVING MAX DISCHARGE OF 40.1 L/S TO THE DIVERTED SILVER LANE BROOK.
6. SURFACE WATER STORAGE REQUIRED FOR TOTAL CATCHMENT ESTIMATED AS 3150m³ AND TO BE PROVIDED WITHIN A MIX OF SWALES, FILTER DRAINS AND UNDERGROUND TANKS / CELLULAR STORAGE.
7. PROPOSED LEVELS ARE BASED ON WARDELL ARMSTRONG DESIGN SEE DWG SH11739-004-E.
8. PETROL INTERCEPTORS TO BE PROVIDED TO HARD STANDING AREAS, FULL RETENTION FOR HGV COACH PARK, BYPASS SEPARATOR FOR CAR PARK & MAIN CENTRAL CAR PARK AND FORECOURT SEPARATOR TO FUEL FILLING STATIONS.
9. SURFACE WATER SUSTAINABLE DRAINAGE (SuDS) TREATMENT TO BE PROVIDED THROUGH A MIX OF RILLS (DRAINAGE CHANNELS / KERBS), FILTER DRAIN / SHALLOW SWALE AND LOCALISED DISCRETE DRY BASINS. LOCATIONS SHOWN ARE INDICATIVE AND SUBJECT TO CONFIRMATION AND TO BE DESIGNED INTO MASTERPLAN.
10. DRAINAGE CHANNELS SHOWN AT LOW AREAS. TO BE USED IN CONJUNCTION WITH DRAWING SH11739-004-E - INDICATIVE LEVELS PLAN.
11. GULLY LOCATIONS NOT SHOWN, GULLIES TO BE LOCATED TO AREAS NOT DRAINED BY DRAINAGE CHANNELS AND KERB DRAINS.
12. FOUL DRAINAGE TO BE DRAINED FROM HOTEL AND FUEL FILLING BUILDINGS TO PUMP STATION AND PUMPED TO UNITED UTILITIES PUBLIC SEWER WITHIN LEACROFT ROAD.

SILVER LANE BROOK DIVERSION CHANNEL

FFL - 20.650m

CELLULAR STORAGE 1000m³ REQUIRED, 1.0m DEEP CRATE

FFL - 22.550m

CELLULAR STORAGE 1825m³ REQUIRED, 1.5m DEEP CRATE

RISING MAIN TO CONNECT INTO SILVER LANE BROOK DIVERSION

SURFACE WATER PUMPING STATION MAX FLOW 40.1 L/S

FOUL PUMPING STATION

FOUL RISING MAIN

SILVER LANE BROOK DIVERSION CHANNEL

FOUL RISING MAIN TO CONNECT TO UNITED UTILITIES 300mm DIA SEWER IN LEACROFT ROAD

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
C	PLANNING ISSUE. RED LINE BOUNDARY ADDED.	06.08.19	MB	JS	JS
B	DRAINAGE UPDATED TO SUIT UPDATED MASTERPLAN. FOUL DRAINAGE STRATEGY ADDED.	26.07.19	AS	JS	JS
A	DRAINAGE UPDATED TO SUIT NEW MASTERPLAN AND BASIN EXTENTS	17.05.19	AS	JS	JS

CLIENT

EXTRA MSA GROUP

PROJECT

MOTORWAY SERVICES, WARRINGTON

DRAWING TITLE

PROPOSED SURFACE AND FOUL WATER DRAINAGE STRATEGIES

DRG No.	REV
SH11739-003	C
DRG SIZE: A1	SCALE: 1:750
DATE: 07/05/19	
DRAWN BY: AS	CHECKED BY: JS
APPROVED BY: JS	

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N:\SH\SH11739 - MOTORWAY SERVICES, WARRINGTON\03 - DESIGN\AUTOCAD\SH11739-003-C PROPOSED SURFACE AND FOUL WATER DRAINAGE STRATEGIES.DWG

wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
2 West Regent Street
Glasgow
G2 1RW
Tel: +44 (0)141 433 7210

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

MANCHESTER
76 King Street
Manchester
M2 4NH
Tel: +44 (0)161 817 5038

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International offices:

ALMATY
29/6 Satpaev Avenue
Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67

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Appendix 3.2 – Correspondence

WARRINGTON
Borough Council

Professor Steven Broomhead
Chief Executive

Steve Peddie
Executive Director
Families and Wellbeing Directorate

Dr Muna Abdel-Aziz
Director of Public Health

1st Floor, New Town House
Buttermarket Street
Warrington
WA1 2NH

Rachel Graham
rgraham@wardell-armstrong.com

Our ref: FOI/NCS/1227

21 January 2019

Dear Ms Graham

Freedom of Information Act Request: Warrington Private Water Supplies

I am writing in response to your request dated 15 January 2019 requesting information about Warrington private water supplies.

You asked: Wardell Armstrong is preparing an environmental impact assessment for a proposed development located between national grid reference SJ 67061 93574 (eastings: 367061, northings: 393574).
Could you please provide me with digital copies of the following within 3km of the co-ordinate.

Private water supplies:
- source type (surface water/ borehole/ spring)
- source location with coordinated
- volumes quantity abstracted
- associated property name and coordinates

We have 3 private water supplies as follows:

<u>Source 1</u>
Type: Borehole
Location: Easting – 363822 Northing - 390186
Volume: 400m3 to 1000m3 per day
Name: Food Manufacturer WA1 4SF

Source 2

Type: Borehole
Location: Easting – 355594 Northing - 393501
Volume: 400m3 to 1000m3 per day
Name: Drink Manufacturer WA5 4TH

Source 3

Type: Borehole
Location: Easting – 363787 Northing - 382276
Volume: 10m3 to 100m3 per day
Name: Adventure Farm WA4 4NW

If you are not satisfied with my response to your request for information, you may ask the Council for an internal review of this decision. You should write to Paul Clisby, Legal Services Manager at Warrington Borough Council, Quattro, Buttermarket Street, Warrington, WA1 1BN, giving details of your complaint. You should do this as soon as possible, or, in any case, within two months of your request being refused.

If, following the outcome of the internal review, you remain dissatisfied with the Council's response to your information request; you have the right under section 50 of the Freedom of Information Act 2000 to appeal to the Information Commissioner at:

Information Commissioner's Office
Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF

Telephone: 0303 123 1113
Fax: 01625 524510
Website: www.ico.gov.uk

Yours sincerely

Mr Dave Watson
Public Protection Unit Manager

Please Contact: Mrs J K Bate
Direct Dial: 01925 442645
E-Mail Address: jbate@warrington.gov.uk

Graham, Rachel

From: Graham, Rachel
Sent: 15 January 2019 11:13
To: 'foi@warrington.gov.uk'
Subject: SH11739 Warrington Private Water Supplies Data Request EIR

Good morning

Wardell Armstrong is preparing an environmental impact assessment for a proposed development located between national grid reference SJ 67061 93574 (eastings: 367061, northings: 393574).

Could you please provide me with digital copies of the following within 3km of the coordinate.

Private water supplies:

- source type (surface water/ borehole/ spring)
- source location with coordinated
- volumes quantity abstracted
- associated property name and coordinates

Many thanks in advance

Rachel

Rachel Graham | Senior Environmental Scientist
Wardell Armstrong LLP
City Quadrant, 11 Waterloo Square, Newcastle Upon Tyne, NE1 4DP
t: 0191 232 0943 m: 07969 102 593

Graham, Rachel

From: GMMC Info Requests <Inforequests.gmmc@environment-agency.gov.uk>
Sent: 31 January 2019 16:10
To: Graham, Rachel
Subject: GMMC113121BF Response attached from the Environment Agency
Attachments: GMMC113121BF - Table.pdf; GMMC113121BF - DFM.PDF; Flood Risk Assessments - Climate Change Allowances.pdf; measure extract template.xlsb; GMMC113121BF - SH11739 Warrington EA Data request.zip; mer-2013-10-wfd(1).pdf; mer-2013-10-wfd(1).pdf; GMMC113121BF Discharge Consents.xlsx; GMMC113121BF Discharge Consents Outlets.csv.xlsx; GMMC113121BF Abstractions.csv.xlsx; GMMC113121BF Water Quality Exemptions.csv.xlsx; GMMC113121BF Closed Pollution Incidents.csv.xlsx; GMMC113121BF Installation Sites.csv.xlsx; GMMC113121BF Authorised Landfill Sites.csv.xlsx; GMMC113121BF Historic Landfill Sites.csv.xlsx; GMMC113121BF Waste Management Licences.csv.xlsx

Dear Rachel,

Thank you for your enquiry which was received on 15/1/19.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose the product information.

Defences - There are no flood defences in the vicinity of the site.

Historic - We have no records of flooding affecting the site. However, this does not mean flooding has not occurred in the past or that it will not flood in future. We recommend that you also contact United Utilities and Warrington Borough Council who may hold additional information (the former especially in relation to sewer flooding).

Reservoir - The Environment Agency Flood map shows that the site is not located in an area at risk of reservoir flooding.

Here are some useful links below:

https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Please find information on mitigation measures in attached spreadsheet. These are all the measures within the water bodies covered by 3km search from NGR provided, they are not restricted to the 3Km radius. If measures have no eastings or northings they are normally applicable throughout the whole water body catchment. Specific measures should have eastings and northings which will allow you to check the relevant location. In addition diffuse pollution measures are normally relevant throughout the catchment.

I have attached the WFD report for one waterbody that falls within the 3km radius.

Please refer to the Open Government Licence which explains the permitted use of this information.

1. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2

2. You may only sublicense others to use it if you do so under a written licence which includes the terms (or equivalent) of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you (subject to clause 5, below).
3. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of one year at the end of which it will terminate automatically without notice.
4. We have restricted use of the Information as a result of legal restrictions placed upon us to protect National Security and Personal Data.
5. The licensee may supply reports including a limited specified geographical area not exceeding 100 square kilometres and limited to internal use with no time restriction on use.
6. This condition does not apply if use is limited to use that is authorised by any statute or use that does not require a licence from us.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Anne Ball
Customer and Engagement Officer
Greater Manchester, Merseyside and Cheshire
External: 020 302 51232
Mobile: 07769285094
Email: Inforequests.gmmc@environment-agency.gov.uk

Graham, Rachel

From: Graham, Rachel
Sent: 15 January 2019 11:19
To: 'Enquiries, Unit'
Subject: SH11739 Warrington EA Data request

Good morning

Wardell Armstrong is working on a project located at national grid reference SJ 67061 93574 (eastings: 367061, northings: 393574).

Could you please provide me with digital copies of the following within 3km of SJ 67061 93574 (eastings: 367061, northings: 393574);

- Consented surface water and groundwater abstractions
    - licence holder
    - licence number
    - coordinates of abstraction source
    - quantity abstracted
    - groundwater levels
    - purpose of abstraction
    - source type of abstraction e.g. spring/ river/ borehole

- Consented surface water and groundwater discharges
    - Licence holder
    - license number
    - coordinates of discharge,
    - receiving waterbody/ groundwater/ to land
    - quantity of discharge per day

- Surface water and groundwater quality records both historical and recent – last 5-10 years.

- Groundwater levels both historical and recent level monitoring – last 5-10 years.

- Groundwater contour plans

- Water Framework Directive investigation reports and WFD programme of measures for relevant waterbodies

- Details of any known Flood Defences on watercourses

- product 4: Detailed Flood Risk Assessment Map, including flood zones, defences and storage areas, areas benefiting from defences, statutory main river designations, historic flood event outlines and more detailed information from our computer river models (including model extent, information on one or more specific points, flood levels, flood flows)

- Information on historic incidents of flooding

- Confirmation of published Flood Map for this area i.e. are there any known issues with the accuracy of the published flood map in this area

- Waste management facilities

- Historic landfills
- Licensed Landfills or mine pits
- Pollution incidents

Many thanks in advance.

Kind regards

Rachel

Rachel Graham | Senior Environmental Scientist
Wardell Armstrong LLP
City Quadrant, 11 Waterloo Square, Newcastle Upon Tyne, NE1 4DP
t: 0191 232 0943 m: 07969 102 593

Appendix 3.3 – Water Framework Directive Screening Assessment

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ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
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EXTRA MSA GROUP

WARRINGTON MOTORWAY SERVICE AREA, J11 M62

APPENDIX 3.3 WATER FRAMEWORK DIRECTIVE SCREENING ASSESSMENT

JULY 2019

wardell armstrong

Wardell Armstrong
Sir Henry Doulton House, Forge Lane, Etruria, Stoke-on-Trent, ST1 5BD, United Kingdom
Telephone: +44 (0)1782 276 700 www.wardell-armstrong.com

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EXTRA MSA GROUP

WARRINGTON MOTORWAY SERVICE AREA, J11 M62

APPENDIX 3.3 WATER FRAMEWORK DIRECTIVE SCREENING ASSESSMENT

JULY 2019

PREPARED BY:

Bethan Joule	Graduate Environmental Scientist	
Rachel Graham	Senior Environmental Scientist	

REVIEWED AND APPROVED BY:

Lauren Ballarini	Technical Director	

CONTENTS

TABLES

1 INTRODUCTION

1.1.1 This Water Framework Directive (WFD) assessment is an appendix to Chapter 9: Water Resources Technical Paper, of the Environmental Statement.

1.1.2 Directive 2000/60/EC of the European Parliament and Council (the Water Framework Directive) came into force on 22nd December 2000 and established a framework for community action in the field of water policy. The WFD required member states to aim to reach good chemical and ecological status in inland and coastal waters by 2015. The WFD is designed to enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, to promote sustainable water use, to reduce pollution of water and to ensure a progressive reduction in groundwater pollution. The WFD established a strategic framework for managing the water environment and requires a Management Plan for each river basin to be developed every six years. In cases where good status / potential could not be achieved by 2015, a provision is given under Article 4(4) of the WFD extending the deadline to 2021 or 2027. The date has been extended to 2027 in respect of a large number of waterbodies. Within England, the competent authority for delivering the WFD is the Environment Agency (EA).

1.1.3 The role of a WFD assessment is to evaluate the potential deterioration in the overall status of a waterbody from a Proposed Development, based on the 2015 River Basin Management Plan (RBMP). It is also to determine whether the Proposed Development may hinder any existing programmes of measures in returning a failing waterbody to Good status.

2 REVIEW OF THE RIVER BASIN MANAGEMENT PLAN AND CATCHMENT

2.1 Surface Water

2.1.1 The Site is located within the North West River Basin District, which is monitored by the Environment Agency (EA)[1] under the WFD and the results of the WFD classification are summarised in the North West River Basin Management Plan (RBMP). The Site is in the 'Mersey Lower' management catchment, the 'Glaze' operational catchment, and the 'Glaze' surface waterbody (ID: GB112069061420).[2] The Glaze surface water catchment is 39.36km^2 in area and the river is 16.75km in length. A summary of the Glaze surface waterbody can be found in Table 1.

Table 1: WFD Status of Glaze Surface Waterbody

Classification Element	2013 Cycle	2014 Cycle	2015 Cycle	2016 Cycle	Objectives
Overall Waterbody					
Overall Waterbody	Moderate	Poor	Poor	Poor	Poor by 2015
Ecological					
Biological quality elements	Moderate	Poor	Poor	Poor	Poor by 2015
Hydromorphological supporting elements	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good by 2015
Physico-chemical quality elements	Moderate	Moderate	Moderate	Moderate	Moderate by 2015
Specific pollutants	Moderate	Moderate	High	High	High by 2015
Chemical					
Priority substances	Fail	Fail	Good	Good	Good by 2015
Other pollutants	DNRA*	DNRA	DNRA	DNRA	DNRA
Priority hazardous substances	Good	Good	Good	Good	Good by 2015
Note *DNRA: Does Not Require Assessment					

2.1.2 The EA have reported a list of reasons why rivers in the Glaze catchment have failed to achieve good WFD status and reasons for deterioration[2], which are presented in Table 2.

[1] Environment Agency (2019) Catchment Data Explore: North West River Basin District [online]. Accessed 16/04/2019. Available at: https://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/12

[2] Environment Agency (2019) Catchment Data Explore: Glaze [online]. Accessed 16/04/2019. Available at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB112069061420

Table 2: Reasons Why Glaze Surface Waterbody is Not Achieving Good WFD Status			
Year	**Classification Element Affected**	**Sector**	**Activity**
2014	Phosphate	Waste water treatment	Water Industry
2014	Phosphate	Unknown (pending investigation)	Agriculture and rural land management
2014	Phosphate	Urbanisation - urban development	Urban and transport
2014	Macrophytes and Phytobenthos Combined	Sewage discharge (continuous)	Water Industry
2014	Fish	Barriers - ecological discontinuity	Industry
2014	Ammonia (Phys-Chem)	Urbanisation - urban development	Urban and transport
2014	Biochemical Oxygen Demand (BOD)	Sewage discharge (intermittent)	Water Industry
2014	Invertebrates	Sewage discharge (intermittent)	Water Industry
2014	Fish	Sewage discharge (intermittent)	Water Industry
2014	Invertebrates	Urbanisation - urban development	Urban and transport
2014	Invertebrates	Transport Drainage	Urban and transport

2.1.3 The EA have not published the programme of measures for the Glaze surface waterbody.

2.2 Groundwater

2.2.1 The Site is located within the 'North West' groundwater management catchment, the 'Mersey Basin Lower and Merseyside North Permo-Triassic Sandstone Aq' operational catchment, and the 'Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers' (LM-NM) groundwater body (ID: GB41201G101700).[3] The LM-NM groundwater body is 627.5km^2 in area and a summary of the WFD Status can be found in Table 3.

Table 3: WFD Status of LM-NM Groundwater Body					
Classification Element	**2013 Cycle**	**2014 Cycle**	**2015 Cycle**	**2016 Cycle**	**Objectives**
Overall Waterbody					
Overall Waterbody	Poor	Poor	Poor	Poor	Good by 2027
Quantitative					
Quantitative Saline Intrusion	Poor	Poor	Poor	Poor	Good by 2027
Quantitative Water Balance	Good	Good	Good	Good	Good by 2015
Quantitative GWDTEs test	Good	Good	Good	Good	Good by 2015

[3] Environment Agency (2019) Catchment Data Explore: Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers [online]. Accessed 16/04/2019. Available at: https://environment.data.gov.uk/catchment-planning/WaterBody/GB41201G101700

Table 3: WFD Status of LM-NM Groundwater Body					
Classification Element	**2013 Cycle**	**2014 Cycle**	**2015 Cycle**	**2016 Cycle**	**Objectives**
Quantitative Dependent Surface Waterbody Status	Good	Good	Good	Good	Good by 2015
Chemical (GW)					
Chemical Drinking Water Protected Area	Poor	Poor	Poor	Poor	Good by 2027
General Chemical Test	Good	Good	Good	Good	Good by 2015
Chemical GWDTEs test	Good	Good	Good	Good	Good by 2015
Chemical Dependent Surface Waterbody Status	Poor	Poor	Poor	Poor	Good by 2027
Chemical Saline Intrusion	Poor	Poor	Poor	Poor	Good by 2027

2.2.2 The EA have reported a list of reasons why the LM-NM groundwater body failed to achieve good WFD status and reasons for deterioration,[3] which are presented in Table 4.

Table 4: Reasons why LM-NM groundwater body failed to achieve Good WFD Status			
Year	**Classification Element Affected**	**Sector**	**Activity**
2014	Chemical Drinking Water Protected Area	Waste water treatment Other	Water Industry
2014	Chemical Drinking Water Protected Area	Unknown (pending investigation)	Other
2014	Chemical Drinking Water Protected Area	Private Sewage Treatment	No sector responsible
2014	Chemical Drinking Water Protected Area	Poor nutrient management	Agriculture and rural land management
2014	Quantitative Saline Intrusion	Saline or other intrusion	No sector responsible
2014	Chemical Drinking Water Protected Area	Poor pesticide management	Agriculture and rural land management
2015	Chemical Saline Intrusion	Saline or other intrusion	No sector responsible
2015	Chemical Dependent Surface Water Body Status	Unknown (pending investigation)	Sector under investigation
2015	Trend Assessment	Unknown (pending investigation)	Sector under investigation

2.2.3 The EA have not published the programme of measures for the LM-NM groundwater body.

3 WATER FRAMEWORK DIRECTIVE SCREENING ASSESSMENT

3.1.1 The Environment Agency's 'Water Framework Directive Risk Assessments: How to Assess the Risk of your Activity'[4] (April 2016) provides guidance as to how to undertake a WFD Assessment. The guidance identifies four stages:

1) make sure that the assessment covers the receptors that are protected by WFD;
2) demonstrate that the activity supports the objectives of the local River Basin Management Plan (RBMP). The wider environmental objectives of the RBMPs that are relevant to physical works are:
    i) to prevent deterioration of the status or potential of surface waters and groundwater; and
    ii) to aim to achieve good status for all water bodies (or for heavily modified water bodies and artificial water bodies, good ecological potential) and good surface water chemical status;
3) if a high level of confidence that your activity supports the objectives of your RBMP cannot be reached then you need to carry out more investigation into the risks on WFD receptors and possible ways of managing those risks. After the amending the project to avoid, minimise, mitigate or compensate for the risks to WFD receptors the following questions need to be addressed:
    i) could the activity still cause a waterbody (catchment/sub-catchment) to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening?
    ii) could the activity prevent or undermine action to get water bodies to good status? and
4) if the answer to the above questions is yes and your activity still does not support RBMP objectives, it will need to be demonstrated that the project meets the sustainability criteria set out in Article 4(7) of the WFD. Article 4(7) sets out stringent environmental and socio-economic tests to assess if a scheme meets strict environmental and sustainability criteria.

3.1.2 Table 5 summarises the risk that the development may have on the Glaze surface waterbody achieving its objectives. Table 6 summarises the risk from the development on the LM-NM groundwater body from achieving its objectives.

[4] Environment Agency (2016) Water Framework Directive Risk Assessment: How to Assess the Risks of your Activity [online]. Accessed15/04/2019. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/522426/LIT_10445.pdf

3.2 Stage 1

3.2.1 The WFD protects the surface waterbodies and groundwater bodies. This assessment covers the Glaze surface waterbody (ID: GB112069061420) and the LM-NM groundwater body (ID: GB41201G101700), therefore the assessment covers the appropriate receptors protected by the WFD.

3.3 Stage 2

3.3.1 The WFD objectives are detailed in Table 1 and Table 3. The overall objective set by the EA for the Glaze surface water catchment is Poor by 2015, and for the LM-NM groundwater body is Good by 2027. The main reasons why the Glaze waterbody is not achieving Good WFD status are defined by the EA as sewage discharge and urbanisation (see Table 2). The main reasons why the LM-NM groundwater body is not achieving Good WFD status is defined by the EA as agriculture and sewage treatment, however the reason for failure of three classification elements is unknown (pending investigation) (see Table 4). The EA have not published the programme of measures for either the Glaze surface waterbody or the LM-NM groundwater body.

3.3.2 Discharges from the Site would be from the surface water SuDS scheme and would be limited to the Sites greenfield runoff rate, in agreement with the EA. However, as shown by the Conceptual Site Hydrogeological Modal (CSHM), if unmitigated, there is the potential for site-derived water to enter onsite watercourses and groundwater therefore, the Proposed Development does not directly support the WFD objectives.

3.4 Stage 3

3.4.1 The Proposed Development, as indicated throughout the Environmental Statement (ES), would be designed and constructed in line with appropriate guidance and legislation. A Construction Management Plan (CMP) (or equivalent) would include appropriate pollution prevention measures, which would prevent polluting materials from entering into the water environment, or minimise the effect if accidental pollution were to occur. The Proposed Development has been designed with appropriate drainage design including the incorporation of SuDS, which would mimic the natural hydrological regime.

3.4.2 Therefore, the Proposed Development is unlikely to cause a deterioration in WFD status class or prevent waterbodies in these catchments from achieving their WFD objectives.

3.5 Stage 4

3.5.1 Stage 4 is not required.

4 CONCLUSION

4.1.1 The Proposed Development has been determined to have no effects which are likely to cause deterioration in WFD status or prevent waterbodies from achieving their WFD objectives, provided that best practice and established guidance is adhered to.

Table 5: WFD Assessment Summary Table for Glaze Surface Waterbody

Activities	WFD objective*						
	Ecological				Chemical		
	Biological quality elements	Hydromorphological supporting elements	Physio-chemical quality elements	Specific pollutants	Priority substances	Other Pollutants	Priority hazardous substances
	Poor by 2015	Supports Good by 2015	Moderate by 2015	High by 2015	Good by 2015	Does not require assessment	Good by 2015
Construction Phase							
Earthworks including excavations	L	L	L	L	L		L
Dewatering of excavations	L	L	L	L	L		L
Use of machinery and storage of chemicals onsite	L	L	L	L	L		L
Soil stripping and vegetation removal	L	L	L	L	L		L
Soil compaction	L	L	L	L	L		L
Construction of impermeable surfaces such as roads / pavements	L	L	L	L	L		L
Use of cement and concrete	L	L	L	L	L		L
Working in proximity to the water environment associated with the river diversion	L	L	L	L	L		L
Working in proximity to the water environment associated with watercourse crossing	L	L	L	L	L		L
Operation Phase							
Use of motorised vehicles of fuel and chemicals	L	L	L	L	L		L
De-Icing of roads, walkways and parking areas	L	L	L	L	L		L
Proximity to the water environment associated with watercourse	L	L	L	L	L		L
Proximity to the water environment associated with river diversion crossing	L	L	L	L	L		L
Peat used in habitat enhancement	L	L	L	L	L		L
Creation of new drainage regime in developed areas of the Site	L	L	L	L	L		L

Note
* From Environment Agency's RBMP.

	Does not require assessment.
L	Low risk of deterioration from current surface waterbody WFD status.
M	Medium risk of deterioration from current surface waterbody WFD status.
H	High risk of deterioration from current surface waterbody WFD status.

Table 6: WFD Assessment Summary Table for Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers Groundwater Body

Activities	WFD objective*								
	Quantitative				Chemical				
	Quantitative Saline Intrusion	Quantitative Water Balance	Quantitative GWDTEs test	Quantitative Dependent Surface Waterbody Status	Chemical Drinking Water Protected Area	General Chemical Test	Chemical GWDTEs test	Chemical Dependent Surface Waterbody Status	Chemical Saline Intrusion
	Good by 2027	Good by 2015	Good by 2015	Good by 2015	Good by 2027	Good by 2015	Good by 2015	Good by 2027	Good by 2027
Construction Phase									
Earthworks including excavations	L	L	L	L	L	L	L	L	L
Dewatering of excavations	L	L	L	L	L	L	L	L	L
Use of machinery and storage of chemicals onsite	L	L	L	L	L	L	L	L	L
Soil stripping and vegetation removal	L	L	L	L	L	L	L	L	L
Soil compaction	L	L	L	L	L	L	L	L	L
Construction of impermeable surfaces such as roads / pavements	L	L	L	L	L	L	L	L	L
Construction of subsurface infrastructure such as foundations	L	L	L	L	L	L	L	L	L
Use of cement and concrete	L	L	L	L	L	L	L	L	L
Peat Stabilisation	L	L	L	L	L	L	L	L	L
Gas pipeline – retaining wall in peat	L	L	L	L	L	L	L	L	L
Operation Phase									
Use of motorised vehicles and storage of fuel and chemicals	L	L	L	L	L	L	L	L	L
De-Icing of roads, walkways and parking areas	L	L	L	L	L	L	L	L	L
Peat used in habitat enhancement	L	L	L	L	L	L	L	L	L
Creation of new drainage regime in developed areas of the Site	L	L	L	L	L	L	L	L	L

Note
* From Environment Agency's RBMP.

	Does not require assessment.
L	Low risk of deterioration from current groundwater body WFD status.
M	Medium risk of deterioration from current groundwater body WFD status.
H	High risk of deterioration from current groundwater body WFD status.

wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
2 West Regent Street
Glasgow
G2 1RW
Tel: +44 (0)141 433 7210

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

MANCHESTER
76 King Street
Manchester
M2 4NH
Tel: +44 (0)161 817 5038

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International offices:

ALMATY
29/6 Satpaev Avenue
Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67

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