

## 7. Water Environment

### 7.1 Introduction

7.1.1 This chapter presents the preliminary assessment of the likely significant effects of the Project with respect to the water environment, including all inland controlled waters and transitional waters, water resources (abstractions and associated catchment areas) and flood risk (property and infrastructure at risk of flooding). The preliminary assessment is based on information obtained to date. It should be read in conjunction with the project description provided in **Chapter 2: The Project** and with respect to relevant parts of the following chapters:

- **Chapter 5: Biodiversity** (in relation to water dependent ecological features);
- **Chapter 12: Ground Conditions** (in relation to the mobilisation of potential contaminants present on site); and
- **Chapter 13: Agriculture and Soil Resources.**

7.1.2 This chapter describes:

- the legislation, policy and technical guidance that has informed the assessment (**Section 7.2**);
- consultation and engagement that has been undertaken to date and how comments from consultees relating to the water environment have been addressed (**Section 7.3**);
- the spatial scope of the assessment (**Section 7.4**);
- the methods used for baseline data gathering (**Section 7.5**);
- overall baseline, including existing and future baseline (**Section 7.6**);
- embedded environmental measures relevant to the water environment (**Section 7.7**);
- the scope of the assessment for the water environment (**Section 7.8**);
- the methodology applied for the assessment (**Section 7.9**);
- the preliminary assessment of the water environment effects (**Section 7.10**);
- a summary of the preliminary significance conclusions (**Section 7.11**); and
- an outline of further work to be undertaken for the Environmental Statement (ES) (**Section 7.12**).

7.1.3 This chapter is supported by the following appendices:

- **Appendix 7A:** Detailed Water Environment Baseline Information;
- **Appendix 7B:** Preliminary Flood Risk Assessment;
- **Appendix 7C:** Preliminary Water Framework Compliance Assessment.

## Limitations and assumptions

- 7.1.4 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of likely significant effects will be reported in the ES. The PEIR has been produced to fulfil the Applicant's consultation duties and enable consultees to develop an informed view of the likely significant effects of the Project.
- 7.1.5 No site visit to collect survey data has been undertaken during PEIR stage due to the ongoing development of the Project design for particular areas of interest. Targeted site walkovers will be undertaken prior to final ES submission.
- 7.1.6 The potential impacts of the pipeline on the groundwater temperature have not been assessed at PEIR stage. No concerns have been raised by stakeholders to date and no specific guidance exists on thermal changes to groundwater due to sub-surface infrastructure. As such, this is currently scoped out of the assessment based on current information.
- 7.1.7 Further flood risk modelling is planned for the detailed assessment of flood risk at three HAGI locations (Higher Walton, Rocksavage and HPP) and further flood risk analysis at one HAGI location (Inovyn HSF).
- 7.1.8 Ground investigation (GI) works for the Project are due to be undertaken during summer/autumn 2022 and will help to inform ground conditions and hydrogeological regimes along specific areas of the pipeline route. This will help to identify areas of interest during the ES stage of the Project.
- 7.1.9 Data was requested from the Environment Agency and although largely complete, some data has limitations, i.e. consented discharge data did not contain discharge volumes or information on whether the discharges were to surface or ground. If data limitations are found to have an impact on the final ES submission then further requests will be made.

## 7.2 Relevant Legislation, Planning Policy and Technical Guidance

- 7.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to the water environment. Further information on policies relevant to the Project is provided in **Chapter 4: Legislation and Policy Overview**.
- 7.2.2 There are two key groups of regulators with respect to the water environment in the vicinity of the PEIR Preliminary Order Limits:
- The Environment Agency (comprised of individual operational areas) - regulates flood risk with regards to main rivers<sup>1</sup> as well as water quality and Water Framework Directive (WFD) compliance for all water bodies; and

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<sup>1</sup> 'Main rivers' are a statutory type of watercourse in England and Wales, usually larger streams and rivers, but also some smaller watercourses, which are formally defined as follows: "*main river means a watercourse or part of a watercourse designated as main*

- Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards (IDBs) - regulate land drainage as well as flood risk from ordinary watercourses and groundwater.

7.2.3 LLFAs are county councils and unitary authorities, whereas IDBs are independent public bodies within their district. The Project interfaces with:

- One Environment Agency Area - North: Greater Manchester, Merseyside and Cheshire; and
- Six LLFAs – District Council areas: Cheshire West and Chester, Cheshire East, Halton, and Warrington; and Metropolitan Districts: Trafford and St. Helens.

7.2.4 There are no IDBs within the Study Area.

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*river on the statutory main river map held by the Environment Agency*". Effectively, a main river is any watercourse over which the Environment Agency exercises its flood defence powers and flood risk activity permitting powers. All other watercourses are referred to as 'ordinary watercourses'. The Lead Local Flood Authority or (where present) Internal Drainage Board are the responsible authorities for consenting engineering works liable to affect ordinary watercourses.

## Legislation

7.2.5 A summary of the relevant legislation is given in **Table 7.1**.

**Table 7.1 Legislation relevant to the water environment assessment**

| Legislation                                                                                                 | Legislative context                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Control of Pollution Act 1974<sup>2</sup></b>                                                            | An Act to make further provision with respect to waste disposal, water pollution, noise, atmospheric pollution and public health.                                                                                                                                                                                                                                                                 |
| <b>Reservoirs Act 1975<sup>3</sup> (as amended by the Flood and Water Management Act, 2010<sup>4</sup>)</b> | Reservoirs are present within the Project area. The Reservoirs Act 1975 provides regulation for the operation and maintenance of reservoirs to ensure the design is fit for purpose, and that maintenance (including frequent inspections of reservoir embankments) ensures the condition of the embankments. As such, the chance of them failing and giving rise to flooding problems is remote. |
| <b>Environment Protection Act 1990<sup>5</sup></b>                                                          | The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. It re-enacts the provisions of the Control of Pollution Act 1974 relating to waste on land, including modifications to the functions of the                                                                                                      |

<sup>2</sup> UK Government (1974). Control of Pollution Act 1974. (online). Available at <https://www.legislation.gov.uk/ukpga/1974/40> (Accessed 3 May 2022).

<sup>3</sup> UK Government (1975). Reservoirs Act 1975. (online). Available at: <https://www.legislation.gov.uk/ukpga/1975/23> (Accessed 3 May 2022).

<sup>4</sup> UK Government (2010). The Flood and Water Management Act 2010, (online). Available at: <https://www.legislation.gov.uk/ukpga/2010/29/contents> (Accessed 3 May 2022).

<sup>5</sup> UK Government (1990). Environmental Protection Act 1990. (online). Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents> (Accessed 3 May 2022).

| Legislation                                                                      | Legislative context                                                                                                                                                                                                                                                                                                                                                                                                  |
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|                                                                                  | regulatory and other authorities concerned in the collection and disposal of waste and makes further provision in relation to such waste.                                                                                                                                                                                                                                                                            |
| <b>Land Drainage Act 1991 and 1994<sup>6</sup></b>                               | The Land Drainage Act (as amended), in combination with the Water Resources Act, stipulates that before work on or near an 'ordinary watercourse' is carried out, an Ordinary Watercourse Consent (OWC) is required. The Flood Defence Consent regime for main rivers, which used to be part of this Act, was replaced by Flood Risk Activities Permits (FRAPs) under the Environmental Permitting Regulations 2016. |
| <b>Countryside and Rights of Way Act 2000<sup>7</sup></b>                        | Sets out the framework for the notification to Local Planning Authorities of Sites of Special Scientific Interest (SSSIs) and agreements between the Nature Conservancy Council and those with interests in such land.                                                                                                                                                                                               |
| <b>Water Resources Act 1991<sup>8</sup></b><br><b>Water Act 2003<sup>9</sup></b> | The Water Resources Act 1991 states that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters <sup>10</sup> . The Act was revised by the Water Act 2003, which sets out regulatory controls for water abstraction, water impoundment and protection of water resources. Of importance to the Project is the                              |

<sup>6</sup> UK Government (1994) Land Drainage Act 1994. (online). Available at: <https://www.legislation.gov.uk/ukpga/1994/25/contents> (Accessed 3 May 2022).

<sup>7</sup> UK Government (2000). Countryside and Rights of Way Act 2000. (online). Available at: <https://www.legislation.gov.uk/ukpga/2000/37/contents>

<sup>8</sup> UK Government (1991). Water Resources Act 1991. (online). Available at: <https://www.legislation.gov.uk/ukpga/1991/57/contents> (Accessed 3 May 2022).

<sup>9</sup> UK Government (2003). Water Act 2003, (online). Available at: <https://www.legislation.gov.uk/ukpga/2003/37/contents> (Accessed 3 May 2022).

<sup>10</sup> The term 'controlled waters' refers to: 'Rivers, streams, estuaries, lakes, canals, ditches, ponds and groundwater as far out as the UK territorial limit. The statutory definition is provided in Section 104 (1) of the Water Resources Act 1991 and Section 30A (d) of the Control of Pollution Act 1974.

| Legislation                                                                                                                                                                         | Legislative context                                                                                                                                                                                                                                                                                                                                                                                               |
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|                                                                                                                                                                                     | requirement to obtain an abstraction licence post DCO submission for dewatering of engineering works and to ensure that any impact on the environment can be mitigated. Provisions for the regulation of water discharges to controlled waters are set out in the Environmental Permitting (England and Wales) Regulations 2016. These have replaced provisions in the earlier Acts.                              |
| <b>Environment Act 1995<sup>11</sup></b>                                                                                                                                            | The Environment Act 1995 established the Environment Agency and gave it responsibility for environmental protection and flood defence.                                                                                                                                                                                                                                                                            |
| <b>Water Resources (Environmental Impact Assessment) Regulations (England and Wales) 2003 (as amended)<sup>12</sup></b>                                                             | The regulation sets out the requirement for an assessment of the impact on the environment of projects likely to have significant effects on the water environment.                                                                                                                                                                                                                                               |
| <b>*The EU Water Framework Directive (2000/60/EC) (WFD) as enacted into domestic law by the Water Environment WFD (England and Wales) (Amendment) Regulations 2017<sup>13</sup></b> | The EU WFD is enacted into domestic law by the Water Environment (WFD) (England and Wales) Regulations 2017, which replace the original Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The WFD established a legislative framework for the protection of surface waters (including rivers, lakes, transitional waters and coastal waters) and groundwater throughout the EU. |

<sup>11</sup> UK Government (1995). Environment Act 1995. (Online) Available at: <https://www.legislation.gov.uk/ukpga/1995/25/contents> (Accessed 3 May 2022).

<sup>12</sup> UK Government (2003). The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2003. (Online) Available at: <https://www.legislation.gov.uk/uksi/2003/164/contents> (Accessed 3 May 2022).

<sup>13</sup> UK Government (2017). Water Resources, England and Wales, The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. (online). Available at: [https://www.legislation.gov.uk/uksi/2017/407/pdfs/ukxi\\_20170407\\_en.pdf](https://www.legislation.gov.uk/uksi/2017/407/pdfs/ukxi_20170407_en.pdf) (Accessed 3 May 2022).

| Legislation                                                                                                                     | Legislative context                                                                                                                                                                                                                                                                                                                   |
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|                                                                                                                                 | A fundamental requirement of the Water Framework Directive (WFD) is to attain “Good” ecological status, or “Good” ecological potential within each defined water body, by December 2027 at the latest and to ensure that any deterioration in status is prevented.                                                                    |
| <b>*Priority Substances Directive (2008/105/EC)<br/>Revision of the Priority Substances Directive (2013/39/EU)<sup>14</sup></b> | Sets out environmental quality standards in the field of water policy for Europe, with the aim of minimising the threat to the aquatic environment and effects such as acute and chronic toxicity to aquatic organisms, accumulation in the ecosystem and losses of habitats and biodiversity, as well as a threat to human health.   |
| <b>Flood and Water Management Act 2010<sup>4</sup></b>                                                                          | The Flood and Water Management Act sets out the Government’s proposals to improve flood risk management, water quality and ensure water supplies are more secure. The Act includes consideration and responsibilities for managing flood risk and consideration of drainage including the use of sustainable drainage systems (SuDS). |
| <b>The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015<sup>15</sup></b>            | Sets out the environmental standards to be used for the second cycle of river basin plans. Along with the updated Water Environment (WFD) (England and Wales) Regulations 2003, they transpose Directive 2013/39/EC on environmental quality standards for priority substances.                                                       |

<sup>14</sup> European Parliament, Council of the European Union (2013). Directive 2013/39/EU of The European Parliament and of The Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy. (online). Available at: <https://www.legislation.gov.uk/eudr/2013/39/contents> (Accessed 3 May 2022).

<sup>15</sup> UK Government, (2015). The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015, (online). Available at: [https://www.legislation.gov.uk/ukxi/2015/1623/pdfs/ukxi0d\\_20151623\\_en\\_003.pdf](https://www.legislation.gov.uk/ukxi/2015/1623/pdfs/ukxi0d_20151623_en_003.pdf) (Accessed 3 May 2022).

| Legislation                                                                                           | Legislative context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <b>Water Quality (Water Supply) Regulations 2016 (as amended)<sup>16</sup></b>                        | This regulation is primarily concerned with the quality of water supplied in England for drinking, washing, cooking and food preparation, and for food production, and with arrangements for the publication of information about water quality.                                                                                                                                                                                                                                                                                                   |
| <b>Private Water Supplies (England) Regulations 2016<sup>17</sup></b>                                 | The Regulations require Local Authorities to monitor Private Water Supplies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Environmental Permitting (England and Wales) Regulations (EPR), 2016 (as amended)<sup>18</sup></b> | The 2016 Environmental Permitting Regulations (as amended) replace the previous 2010 Regulations. They provide a consolidated framework for environmental permits and exemptions for waste operations and water discharge activities (previously consented under the Water Resources Act 1991, and the Control of Pollution Act 1974), and groundwater activities. They also set out the powers, functions and duties of the regulators.                                                                                                           |
| <b>Conservation of Habitats and Species Regulations 2017<sup>19</sup></b>                             | The Conservation of Habitats and Species Regulations 2017 are enacted within England and Wales to transpose the EU Habitats Directive (92/43/EEC)* and aspects of the Wild Birds Directive (2009/147/EC)*. The Regulations cover the selection, designation, registration and management of European sites (also known as Natura 2000 sites), and list European protected species of animals and plants. Conservation Objectives must ensure that the European protected species identified as qualifying features of a Natura 2000 site remain or |

<sup>16</sup> UK Government (2016). The Water Supply (Water Quality) Regulations 2016. (online). Available at: <https://www.legislation.gov.uk/uksi/2016/614/contents/made> (Accessed 3 May 2022).

<sup>17</sup> UK Government (2016). The Private Water Supplies (England) Regulations 2016. (online). Available at: <https://www.legislation.gov.uk/uksi/2016/618/contents> (Accessed 3 May 2022).

<sup>18</sup> UK Government (2016). The Environmental Permitting (England and Wales) Regulations 2016 together with subsequent amendments. (online). Available at: [https://www.legislation.gov.uk/uksi/2016/1154/pdfs/uksi\\_20161154\\_en.pdf](https://www.legislation.gov.uk/uksi/2016/1154/pdfs/uksi_20161154_en.pdf) (Accessed 3 May 2022).

<sup>19</sup> UK Government (2017). The Conservation of Habitats and Species Regulations 2017. (online). Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made> (Accessed 3 May 2022).

| Legislation                                                                                                                                                                                                                                                                                             | Legislative context                                                                                                                                                                                                            |
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|                                                                                                                                                                                                                                                                                                         | reach favourable condition (such as by maintaining the extent and distribution of habitats of qualifying features).                                                                                                            |
|                                                                                                                                                                                                                                                                                                         | This means that where a proposed development may affect a Conservation Objective of a Natura 2000 site, the design will need to include appropriate measures to ensure the Conservation Objectives are not adversely affected. |
| <b>Environment Act 2021<sup>20</sup></b>                                                                                                                                                                                                                                                                | Set out provisions to establish a post-Brexit set of statutory environmental principles and ensure environmental governance and binding targets on water quality.                                                              |
| *EU legislation which applied directly or indirectly to the UK before 31 December 2020 has been retained in UK law through the European Union (Withdrawal) Act (2018) <a href="https://www.legislation.gov.uk/eu-legislation-and-uk-law">https://www.legislation.gov.uk/eu-legislation-and-uk-law</a> . |                                                                                                                                                                                                                                |

## Planning policy

7.2.6 A summary of the relevant national and local planning policy is given in **Table 7.2**.

**Table 7.2 Planning policy relevant to the water environment assessment**

| Policy                                                                      | Policy context |
|-----------------------------------------------------------------------------|----------------|
| <b>National planning policy</b>                                             |                |
| <b>Overarching National Policy Statement for Energy (EN-1)<sup>21</sup></b> |                |

<sup>20</sup> UK Government (2021). The Environmental Act 2021. (online). Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> (Accessed 3 May 2022).

<sup>21</sup> Department of Energy and Climate Change, (2011). Overarching National Policy Statement for Energy (EN-1) (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-)

| Policy                                                                            | Policy context                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.8 Climate change adaptation                                                     | Sets out how the effects of climate change should be considered and how the UK will adapt to the effects of climate change.                                                                                                                                                                                     |
| 5.7 Flood risk                                                                    | To ensure that flood risk from all sources is considered at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk.                                                                                      |
| 5.15 Water quality and resources                                                  | To ensure that all potential adverse effects on water quantity and quality including the ecological effects resulting from physical modifications are considered at all stages of the development.                                                                                                              |
| <b>Draft Overarching National Policy Statement for Energy (EN-1)<sup>22</sup></b> |                                                                                                                                                                                                                                                                                                                 |
| Section 4.9 Climate change adaptation                                             | The amended policy includes reference to new renewable energy infrastructure, reduced greenhouse gas emissions and the inclusion of coastal change considerations.                                                                                                                                              |
| <b>Section 5.8 Flood risk</b>                                                     | Sets out the minimum requirements of a flood risk assessment as well as information on the application of the Sequential and Exception tests. The amended policy states that projects should aim for climate resilient infrastructure and improve the sustainability of existing infrastructure where possible. |

energy-en1.pdf (Accessed 3 May 2022). A draft update of NPS-EN1 was published for consultation in September 2021, but has not yet superseded the 2011 version.

<sup>22</sup> Dept for Business Energy and Industrial Strategy (2021). Draft Overarching National Policy Statement for Energy (EN-1). (online) Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1015233/en-1-draft-for-consultation.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf) (Accessed August 2022).

| Policy                                                                                       | Policy context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Section 5.16 Water quality and resources.                                                    | The amended policy sets out the responsibility of the applicant to demonstrate appropriate surface water management and pollution control.                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>NPS for Oil and Gas Supply and Storage (EN-4)<sup>23*</sup></b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2.2 Climate change adaptation                                                                | Sets out generic considerations that applicants and the IPC should take into account to help ensure that new energy infrastructure is resilient to climate change and to identify the likely increases in risks to some of this infrastructure, from flooding or rising sea levels and approach to infrastructure resilience.                                                                                                                                                                                                                   |
| 2.22 Gas and Oil Pipelines Impacts: Water Quality and Resources                              | <p>This policy advice in this NPS may be a material consideration when identifying impacts arising from applications for pipelines intended to transport other substances.</p> <p>This policy sets out the generic approach to the protection of the water environment during the construction, operation and decommissioning of a project. Section 4.10 of EN-1 sets out policy on the pollution control framework. EN-1 emphasises the need for good design and planning to ensure the efficient use of water, including water recycling.</p> |
| <b>Draft NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)<sup>24</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

<sup>23</sup> Department of Energy and Climate Change. National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4), (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47857/1941-nps-gas-supply-oil-en4.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47857/1941-nps-gas-supply-oil-en4.pdf) (Accessed 3 May 2022). \*A draft update of NPS-EN4 was published for consultation in September 2021, but has not yet superseded the 2011 version.

<sup>24</sup> Department for Business Energy & industrial Strategy (2021). Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). (Online) Available at <https://www.gov.uk/government/consultations/planning-for-new-energy-infrastructure-review-of-energy-national-policy-statements> (Accessed 3 May 2022).

| Policy                                                                                                                                         | Policy context                                                                                                                                                                                                                                                                                                                                                                             |
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| Section 2.2 Climate change adaptation                                                                                                          | Refers to flood risk, stating that applicants should set out how the proposal will be resilient to increased risk of flooding.                                                                                                                                                                                                                                                             |
| <b>Section 2.22 Water Quality and Resources</b>                                                                                                | Sets out that in the case of aquifer storage the applicant should assess the impact of the displacement of groundwater with respect to its potential interference with groundwater flow pathways and flood risk.                                                                                                                                                                           |
| <b>Section 2.22.6 sustainable drainage systems</b>                                                                                             | Sets out the use of sustainable drainage systems to control runoff as part of mitigation measures.                                                                                                                                                                                                                                                                                         |
| <b>National Planning Policy Framework (NPPF) <sup>25</sup></b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Meeting the challenge of climate change, flooding and coastal change<br>Planning and flood risk: 161-169<br>Sequential Test                 | To steer new development to areas with the lowest probability of flooding in accordance with Table 3 of the Flood Risk and Coastal Change planning practice guidance.                                                                                                                                                                                                                      |
| 4. Meeting the challenge of climate change, flooding and coastal change<br>Planning and flood risk: 161-169<br>Exception Test                  | The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available or appropriate, as long as the development can be demonstrated to be safe and provides wider sustainability benefits. |
| 4. Meeting the challenge of climate change, flooding and coastal change<br>Planning and flood risk: 167<br>Sustainable Drainage Systems (SuDS) | A presumption that SuDS will be incorporated into new developments to minimise the impacts of development from any increase in surface runoff.                                                                                                                                                                                                                                             |

<sup>25</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework, (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) (Accessed 3 May 2022).

| Policy                                                                                                                            | Policy context                                                                                                                                                                                                                                                                                                                                                                            |
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| 15. Conserving and enhancing the natural environment                                                                              | Decisions should contribute to protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils. Preventing new and existing development from creating unacceptable risk from water or pollution and help improve the local environmental conditions such as water quality, taking into account relevant information such as river basin management plans. |
| 14. Meeting the challenge of climate change, flooding and coastal change<br>Planning for climate change                           | To ensure the impact of climate change is taken into account for the expected lifetime of development.                                                                                                                                                                                                                                                                                    |
| <b>Cheshire West and Chester Adopted Development Plan, 29 January 2015<sup>26</sup></b>                                           |                                                                                                                                                                                                                                                                                                                                                                                           |
| ENV1 Flood Risk and Water Management                                                                                              | Seeks to reduce flood risk and to protect and enhance water quality through an appropriate Flood Risk Assessment (FRA), mitigation and designed to reduce surface water run-off rates to include the implementation of SuDS.                                                                                                                                                              |
| ENV7 Alternative energy supplies                                                                                                  | The Council will support renewable and low carbon energy proposals where there are no unacceptable impacts on water, biodiversity and the natural environment.                                                                                                                                                                                                                            |
| <b>Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies - adopted 18 July 2019<sup>27</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                           |
| 15 Flood risk and water management                                                                                                | Sets out policies associated with direct development to areas at low risk of flooding and actively manage and reduce flood risk, comprising:                                                                                                                                                                                                                                              |

<sup>26</sup> Cheshire West and Cheshire Council, (2015). Cheshire West and Chester Adopted Development Plan, (online). Available at: [http://consult.cheshirewestandchester.gov.uk/portal/cwc\\_ldf/adopted\\_cwac\\_lp/lp\\_1\\_adopted?tab=files](http://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/adopted_cwac_lp/lp_1_adopted?tab=files) (Accessed 3 May 2022).

<sup>27</sup> Cheshire West and Cheshire Council, (2019). Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies, (online). Available at: [https://consult.cheshirewestandchester.gov.uk/portal/cwc\\_ldf/adopted\\_cwac\\_lp/parttwo\\_adopted?pointId=5428432](https://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/adopted_cwac_lp/parttwo_adopted?pointId=5428432) (Accessed 3 May 2022).

| Policy                                                              | Policy context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                                                                     | DM40 - Development and flood risk;<br>DM41 - SuDS;<br>DM42 - Flood water storage; and<br>DM43 - Water quality, supply and treatment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Cheshire East Local Plan Strategy, 27 July 2017<sup>28</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| SE12 Pollution, Land Contamination and Land Instability             | Requires that no development results in a harmful or cumulative impact upon surface water and groundwater quality, soil contamination pollution, or any other pollution which would unacceptably affect the natural and built environment, or cause harm.                                                                                                                                                                                                                                                                                                                                                              |
| SE13 Flood Risk and Water Management                                | All developments at risk of flooding should be supported by an appropriate FRA to reduce the risk of flooding, taking into account the impacts of climate change in line with the Cheshire East Strategic Flood Risk Assessment (SFRA). In addition, improvements to the current surface water drainage network are sought and to be designed to manage surface water. This should include appropriate SuDS and must not result in an increase in runoff. Developments should enhance and protect surface and ground water quality and comply with the WFD in ensuring with suitable mitigation measures are in place. |
| <b>Trafford Local Plan Core Strategy, January 2012<sup>29</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| L5 Climate Change                                                   | States that any development that has potential to cause adverse pollution of water or ground will not be permitted unless it includes mitigation measures. The Council will also control development in areas at risk of flooding considering the level of risk, requiring an appropriate FRA at the planning application stage. In addition, surface water run-off should be reduced through the use of appropriate SuDS based on mapping within the Council's SFRA.                                                                                                                                                  |

<sup>28</sup> Cheshire East Council, (2017). Cheshire East Local Plan Strategy 2010-2030. (online). Available at: <https://www.cheshireeast.gov.uk/pdf/planning/local-plan/local-plan-strategy-web-version-1.pdf> (Accessed 3 May 2022).

<sup>29</sup> Trafford Council, (2021). Trafford Local Plan Core Strategy. (online). Available at: <https://www.trafford.gov.uk/planning/strategic-planning/docs/core-strategy-adopted-final.pdf> (Accessed 3 May 2022).

| Policy                                                                | Policy context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R2 Natural Environment                                                | Ensures the protection and enhancement of the natural environment biodiversity, designated sites of national, regional and local importance and areas of open water and watercourses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| R3 Green Infrastructure                                               | Ensure through high quality and multi-functional green infrastructure enhance flood risk management through water storage or run-off protection, integrating mitigation measures such as SuDS into the design and reducing water pollution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Warrington Local Plan Core Strategy, 21 July 2014<sup>30</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Policy QE 4 Flood Risk                                                | <p>Support will be given where the risk of flooding has been fully assessed and justified by an agreed Flood Risk Assessment where:</p> <ul style="list-style-type: none"> <li>• 1 hectare, or greater, of a new development is within Flood Zone 1 and/ or Critical Drainage Areas as defined by the SFRA;</li> <li>• new development are within Flood Risk Zones 2 and 3; and</li> <li>• a minor development, or change of use (where a more vulnerable use may be susceptible to other sources of flooding), is within Flood Risk Zones 2 and 3.</li> </ul> <p>The policy outlines the requirements to manage surface water run-off, to ensure that flood risk is not increased, the use of SuDS, floodplain compensatory storage and safe design within development proposals. Any development identified as at intermediate and high risk of surface water flooding (greater than 0.5 hectares) should be supported by a FRA which considers information in Warrington's SFRA and Preliminary Flood Risk Assessment (PFRA).</p> |
| Policy QE 6 Environment and Amenity Protection                        | <p>To ensure no adverse impact on the environment including:</p> <ul style="list-style-type: none"> <li>• the integrity and continuity of tidal and fluvial flood defences;</li> <li>• the quality of water bodies, including canals, rivers, ponds and lakes; and</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

<sup>30</sup> Warrington Borough Council, (2014). Local Plan Core Strategy. (online). Available at: [https://www.warrington.gov.uk/sites/default/files/2019-08/local\\_plan\\_core\\_strategy\\_adopted\\_2014.pdf](https://www.warrington.gov.uk/sites/default/files/2019-08/local_plan_core_strategy_adopted_2014.pdf) (Accessed 3 May 2022).

| Policy                                                                                            | Policy context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                   | <ul style="list-style-type: none"> <li>groundwater resources in terms of their quantity, quality and the ecological features they support.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>St Helens Core Strategy, 31 October 2012<sup>31</sup></b>                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Policy CP 1 Ensuring Quality Development                                                          | <p>To ensure the protection of watercourses from encroachment, modification and degradation and return modified/degraded water bodies to sustainable, natural environments. Also, to mitigate against the effects of water pollution (including contamination of soil, surface water and groundwater resources).</p> <p>For environmental quality any development should be located in an area compatible with the identified Flood Zone in the SFRA, avoiding adding to the causes and sources of flood risk and ensuring no adverse impact on other sites. In addition, the protection from the risk of flooding, through the use of SuDS and/or other appropriate measures and/or flood defences will be required.</p> |
| <b>Halton Core Strategy, April 2013<sup>32</sup><br/>Halton Local Plan, May 2019<sup>33</sup></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Policy CS19: Sustainable Development and Climate Change                                           | Development should incorporate appropriate climate change resilience including passive design features, conservation measures and the management of surface water run-off.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

<sup>31</sup> St Helens Council, (2012). St Helens Core Strategy 2012. (online). Available at: <https://www.sthelens.gov.uk/planning-building-control/planning-policy/core-strategy/> (Accessed 3 May 2022).

<sup>32</sup> Halton Borough Council. (2013). Halton's Local Plan Core Strategy April 2013. (online). Available at: <https://www3.halton.gov.uk/Documents/planning/planning%20policy/CoreStrategy.pdf> (Accessed 3 May 2022).

<sup>33</sup> Halton Local Plan, 2014-2037. Delivery and Allocations Local Plan (incorporating Partial Review of the Core Strategy) (Regulation 19) Proposed Submission Draft May 2019. (online). Available at: <https://modern.gov.halton.gov.uk/documents/s56900/Halton%20Local%20Plan%20-%20PropSubmsn%20Committee%202019-02-28%201831%20r1.pdf> (Accessed 3 May 2022).

| Policy                                        | Policy context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Policy CS20: Natural and Historic Environment | <p>A hierarchical approach will be given to the protection, nature conservation and enhancement of biodiversity including:</p> <ol style="list-style-type: none"> <li>1. sites of international importance including the Mersey Estuary Special Protection Area (SPA) and 'Ramsar' site;</li> <li>2. sites of national importance including Sites of Special Scientific Interest (SSSI) namely; The Mersey Estuary, Flood Brook Clough and Red Brow Cutting; and, sites of local importance including Local Nature Reserves (LNRs), Local Wildlife Sites (LWS) and Ancient Woodland.</li> </ol> |
| Policy CS21: Green Infrastructure             | To sustain the protection of internationally important sites for biodiversity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Policy CS23: Managing Pollution and Risk      | To control development which may give rise to pollution of water. To manage flood risk and not exacerbate existing levels of flood risk nor place residents or property at risk. This is to be achieved by predicting the level of flood risk, both at present and taking into consideration the likely effects of climate change and using Halton's SFRA in accordance with national planning policy. The requirement of site-specific FRAs for proposals in areas at risk from flooding as identified in the Halton SFRA.                                                                     |

## Technical guidance

- 7.2.7 A summary of relevant publicly available technical guidance for the water environment is given in **Table 7.3**. Requests have been made to LLFAs for SuDS and ordinary watercourse consenting guidance from those LLFAs where this information is not currently publicly available on local Authority websites (Halton and St. Helens Borough Councils).

Table 7.3 Technical guidance relevant to the Water Environment assessment

| Technical guidance document                                                                                          | Context                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction Industry Research and Information Association (CIRIA) reports</b>                                    |                                                                                                                                                                                                                                                                   |
| <b>Report C532: Control of Water Pollution from Construction Sites (2001)<sup>34</sup></b>                           | Provides practical support for consultants and contractors on how to plan and manage construction projects to control water pollution.                                                                                                                            |
| <b>Report C624: Development and Flood Risk - Guidance for the Construction Industry (2004)<sup>35</sup></b>          | Guidance for developers and the construction industry on the implementation of good practice in the assessment and management of flood risk as part of the development process and is intended to promote development that is sustainable in terms of flood risk. |
| <b>Report C648: Control of Water Pollution from Linear Construction Projects (2006)<sup>36</sup></b>                 | Guidance for clients, consultant, designers, contractors and regulators on how to plan and manage water pollution from linear construction projects.                                                                                                              |
| <b>Report C649: Control of Water Pollution from Linear Construction Projects - Site Guidance (2006)<sup>37</sup></b> | Guidance specifically aimed at on-site construction personnel working on linear infrastructure construction projects.                                                                                                                                             |

<sup>34</sup> Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M. and Owens, D. (2001) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors. C532. CIRIA; London.

<sup>35</sup> Lancaster, J., Preene, M. and Marshall, C. (2004) Development and Flood Risk – Guidance for the Construction Industry. C624. CIRIA; London.

<sup>36</sup> Murnane, E., Heap, A. and Swain, A. (2006) Control of Water Pollution from Linear Construction Projects – Technical Guidance. C648. CIRIA; London.

<sup>37</sup> Murnane, E., Heap, A. and Swain, A. (2006) Control of water pollution from Linear Construction Projects – Site Guide. C649. CIRIA; London.

| Technical guidance document                                                                          | Context                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report C650: Environmental Good Practice on Site, second edition (2005)<sup>38</sup></b>          | Provides practical guidance about managing construction on-site to control environmental impacts.                                                                           |
| <b>Report C651: Environmental Good Practice - Pocket Book (2005)<sup>39</sup></b>                    | Contains a series of good practice checklists to follow while working on a project, from design and planning through the construction phase on-site, to project completion. |
| <b>Report C689: Culvert Design and Operation Guide (2010)<sup>40</sup></b>                           | Comprehensive guidance covering a range of issues pertinent to the management and design of culverts.                                                                       |
| <b>Report C692: Environmental Good Practice on Site (2010)<sup>41</sup></b>                          | General good practice guidance and practical advice for the management of construction sites to minimise environmental impacts.                                             |
| <b>Report C698: Site Handbook for the Construction of SuDS (2007)<sup>42</sup></b>                   | Guidance for site engineers and SuDS practitioners on the construction of SuDS to facilitate their effective implementation within developments.                            |
| <b>Report C753: The SuDS Manual (2015)<sup>43</sup></b>                                              | Best practice guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.           |
| <b>Pollution Prevention Guidance Notes (PPGs) and Guidance for Pollution Prevention Notes (GPPs)</b> |                                                                                                                                                                             |

<sup>38</sup> Charles, P. and Connolly, S. (2005) Environmental Good Practice Site Guide (second edition). C650. CIRIA; London.

<sup>39</sup> Chant-Hall, G., Charles, P. and Connolly, S. (2005) Environmental good practice on site – pocket book. C651. CIRIA; London.

<sup>40</sup> Balkham, M., Fosbeary, C., Kitchen, A. and Rickard, C. (2010) Culvert design and operation guide. C689. CIRIA; London.

<sup>41</sup> Audus, I., Charles, P. and Evans, S. (2010) Environmental good practice on site (third edition). C692. CIRIA; London.

<sup>42</sup> Woods Ballard, B., Kellagher, R., Martin, P., Jefferies, C., Bray, R. and Shaffer, P. (2007) Site Handbook for the Construction of SUDS. C698. CIRIA; London

<sup>43</sup> Woods Ballard, S., Wilson, S., Udale-Clarke, H., Illman, S., Scott, T., Ashley, R. and Kellagher, R. (2015). The SuDS Manual. C753. CIRIA; London.

| Technical guidance document                                                                                | Context                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GPP 1: A general guide to preventing pollution (October 2020)<sup>44</sup></b>                          | Guidance document based on relevant legislation and reflects current good practice in pollution prevention.                                       |
| <b>GPP 2: Above ground oil storage tanks (January 2017)<sup>45</sup></b>                                   | Guidance to support the safety of above ground oil storage tanks and minimise the risk of causing pollution.                                      |
| <b>PPG 3: Use and design of oil separators in surface water drainage systems (April 2006)<sup>46</sup></b> | Guidelines to support decision making on whether an oil separator is needed for a site, and if so what size and type of separator is appropriate. |
| <b>GPP 5: Works and maintenance in or near water (February 2018)<sup>47</sup></b>                          | Guidance document based on relevant legislation and reflects current good practice for working in or near water.                                  |

<sup>44</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2020). GPP 1: A general guide to preventing pollution. (online). Available at: <https://www.netregs.org.uk/media/1835/gpp-1.pdf> (Accessed 3 May 2022).

<sup>45</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2017). Above ground oil storage tanks: GPP 2. (online). Available at: <https://www.netregs.org.uk/media/1475/gpp-2-pdf-jan-2018.pdf> (Accessed 3 May 2022).

<sup>46</sup> Environment and Heritage Service, Scottish Environmental Protection Agency and Environment Agency (2006). Use and design of oil separators in surface water drainage systems: PPG 3. (online). Available at: <https://www.netregs.org.uk/media/1671/ppg-3.pdf> (Accessed 3 May 2022).

<sup>47</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2018). Works and maintenance in or near water: GPP 5. Version 1.2. (online). Available at: [https://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf?utm\\_source=website&utm\\_medium=social&utm\\_campaign=GPP5%2027112017](https://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf?utm_source=website&utm_medium=social&utm_campaign=GPP5%2027112017) (Accessed 3 May 2022).

| Technical guidance document                                                                       | Context                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PPG 6: Working at construction and demolition sites (2012)<sup>48</sup></b>                    | Practical advice and guidance to help prevent pollution from construction and demolition sites. Sets out legislative requirements and good practice measures to reduce the risk of a pollution incident. |
| <b>PPG 7: Safe storage - The safe operation of refuelling facilities (July 2011)<sup>49</sup></b> | Guidelines for liquid refuelling facilities, based on relevant legislation and reflects current good practice.                                                                                           |
| <b>GPP 8: Safe storage and disposal of used oils (July 2017)<sup>50</sup></b>                     | Guidance based on relevant legislation and reflects current good practice for the safe storage and disposal of used oils.                                                                                |
| <b>PPG 18: Managing fire water and major spillages (June 2000)<sup>51</sup></b>                   | Guidance to assist in the identification of the equipment and techniques available to prevent and mitigate the damage to the water environment caused by fires and major spillages.                      |

<sup>48</sup> Environment Agency (2012). Working at construction and demolition sites: PPG6. Second edition. Bristol: Environment Agency.

<sup>49</sup> Environment Agency, Scottish Environmental Protection Agency and Northern Ireland Environment Agency (2011) The safe operation of refuelling facilities: PPG 7. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/485206/pmho0711btzl-e-e.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/485206/pmho0711btzl-e-e.pdf) (Accessed 3 May 2022).

<sup>50</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2017) GPP 8 Safe storage and disposal of used oils. (online). Available at: <https://www.netregs.org.uk/media/1435/gpp-8-v3-swni.pdf> (Accessed 3 May 2022).

<sup>51</sup> Environment and Heritage Service, Scottish Environmental Protection Agency and Environment Agency (n.d.) Managing fire water and major spillages: PPG18. (online). Available at: <https://www.netregs.org.uk/media/1674/ppg-18.pdf> (Accessed 3 May 2022).

| Technical guidance document                                                           | Context                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GPP 19: Vehicles: Service and Repair (June 2017)</b> <sup>52</sup>                 | Guidance aimed at businesses that deal with vehicles (applicable to other machinery, plant and equipment).                                                                                                                                           |
| <b>GPP 20: Dewatering underground ducts and chambers (January 2018)</b> <sup>53</sup> | Guidelines for dewatering underground ducts and chambers, based on relevant legislation and reflects current good practice.                                                                                                                          |
| <b>GPP 21: Pollution incident response planning (July 2017)</b> <sup>54</sup>         | Guidelines setting out current best practice for producing an Incident Response Plan.                                                                                                                                                                |
| <b>GPP 22: Dealing with spills (October 2018)</b> <sup>55</sup>                       | Guidance applicable to those responsible for storing and transporting materials that could cause pollution if they spill. It may also be useful for those who respond to spills, or those responsible for transporting or storing waste from spills. |

<sup>52</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (n.d.) GPP 19: Vehicles: Servicing and Repairs. (online). Available at: <https://www.netregs.org.uk/media/1437/new-gpp-19-pdf.pdf> (Accessed 3 May 2022).

<sup>53</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (n.d.) GPP 20 Dewatering underground ducts and chambers. (online). Available at: <https://www.netregs.org.uk/media/1477/gpp-20-publisher-pdf-version.pdf> (Accessed 3 May 2022).

<sup>54</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2017) GPP 21: Pollution Incident Response Plans. (online). Available at: <https://www.netregs.org.uk/media/1436/gpp-21-final.pdf> (Accessed 3 May 2022).

<sup>55</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2018). Dealing with spills: GPP 22. Version 1. (online). Available at: <https://www.netregs.org.uk/media/1643/gpp-22-dealing-with-spills.pdf> (Accessed 3 May 2022).

| Technical guidance document                                                                                         | Context                                                                                                                                                                                                                                                                                                         |
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| <b>GPP 26 Safe storage - drums and intermediate bulk containers (IBCs) (July 2018)<sup>56</sup></b>                 | Guidance aimed at site operators and those responsible for the storing and handling of drums and IBCs.                                                                                                                                                                                                          |
| <b>Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems<sup>57</sup></b> | This document sets out non-statutory technical standards for sustainable drainage systems, comprising flood risk outside or inside the development, peak flow and volume control, structural integrity and designing for construction and maintenance considerations.                                           |
| <b>The Flood Risk and Coastal Change Planning Practice Guidance (PPG) supporting NPPF<sup>58</sup></b>              | Sets tests to protect people and property from flooding local planning follow, and in line with national policy where these tests are not met then new development should not be allowed. Steps are broad ranging and are designed to ensure that better sites are developed in terms of flood risk and safety. |
| <b>Environment Agency Guidance Flood risk assessments: climate change allowances<sup>59</sup></b>                   | Sets out when and how local planning authorities, developers and their agents should use climate change allowances in flood risk assessments.                                                                                                                                                                   |

<sup>56</sup> Natural Resources Wales, Northern Ireland Environment Agency and Scottish Environmental Protection Agency (2018). GPP 26: Safe storage of Drums and Intermediate Bulk Containers (IBCs). (online). Available at: <https://www.netregs.org.uk/media/1693/gpp-26-safe-storage-of-drums-and-ibcs.pdf> (Accessed 3 May 2022).

<sup>57</sup> Department for Environment, Food and Rural Affairs (March 2015). Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf) (Accessed 3 May 2022).

<sup>58</sup> Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government Guidance Flood risk and coastal change. (online). Available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change> (Accessed 3 May 2022).

<sup>59</sup> Environment Agency, Flood risk assessments: climate change allowances. (online). Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (Accessed 3 May 2022).

| Technical guidance document                                                     | Context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <b>The Environment Agency's approach to groundwater protection<sup>60</sup></b> | This guidance covers the overarching groundwater protection principles and approaches that will apply to different activities, i.e. installation of infrastructure and the discharge of liquid effluents into the ground. The document updates Groundwater Protection: Principles and Practice (GP3) and provides information about the approach to managing (including in terms of flooding from groundwater) and protecting groundwater. The primary aim of all of the position statements is the prevention of pollution of groundwater and protection of it as a groundwater resources and the protection of water intended for human consumption. |
| <b>Flood risk activities: environmental permits<sup>61</sup></b>                | This guidance sets out the requirements under which an environmental permit is required from the Environment Agency for works in an around Main Rivers, flood defence structures, in a floodplain or around a sea defence. It also provides details of those activities which are excluded from regulation. Regulated activities fall into three categories: those which are exempt and only require registration; low impact activities which require a 'standard rules' permit; and higher impact activities which require a 'bespoke' permit.                                                                                                       |
| <b>Groundwater activity exclusions from environmental permits<sup>62</sup></b>  | This guidance covers extremely low-risk discharges that are not groundwater activities called exclusions and where an environmental permit or exemption is not required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

<sup>60</sup> Environment Agency (2017), The Environment Agency's approach to groundwater protection. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/692989/Environment-Agency-approach-to-groundwater-protection.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Environment-Agency-approach-to-groundwater-protection.pdf) (Accessed 3 May 2022).

<sup>61</sup> Environment Agency and Department for Environment, Food & Rural Affairs (2022), Flood risk activities: environmental permits. Available at: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits> (Accessed 3 May 2022).

<sup>62</sup> Environment Agency (2021), Groundwater activity exclusions from environmental permits. (online). Available at: <https://www.gov.uk/government/publications/groundwater-activity-exclusions-from-environmental-permits/groundwater-activity-exclusions-from-environmental-permits> (Accessed 3 May 2022).

| Technical guidance document                                                                              | Context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <b>Groundwater risk assessment for your environmental permit<sup>63</sup></b>                            | This guidance covers explains how to carry out a groundwater risk assessment for activities that could directly or indirectly pollute groundwater. This is for all water underground in the saturation zone (below the water table) and in direct contact with the ground or subsoil.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Chester East Council - SuDS and Surface water management - all planning applications<sup>64</sup></b> | <p>This guidance covers all developments in Cheshire East and states that they are required to have SuDS and must include a site-specific Surface Water Drainage Strategy following sustainable urban drainage guidelines (SuDS). Consideration is given to sustainable surface water management as a material planning, surface water run off rates, drainage hierarchy, critical drainage areas, connecting to highway drains, managing watercourses and culverts and connecting to public sewers.</p> <p>On greenfield sites, surface water run off must be managed to achieve at least no increase in run off rates. Where possible, there should be a reduction in rates. On previously-developed sites, run off proposals should demonstrate a reduction in rates in line with the non-Statutory Technical Standards for Sustainable Drainage Systems (2015) (or any later replacement standards).</p> |
| <b>Chester East Council - Sustainable Drainage System design guidance for Cheshire East<sup>65</sup></b> | This guidance covers how SuDS planning approval applicants can achieve compliance with policy requirements set out in the NPPF and the Cheshire East Local Plan. It states that “ <i>hard engineering solutions are not the preferred approach and are unlikely to deliver integrated environmental and design benefits</i> ”. Instead, applicants should incorporate surface level SuDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

<sup>63</sup> Environment Agency (2018), Groundwater risk assessment for your environmental permit. (online). Available at: <https://www.gov.uk/guidance/groundwater-risk-assessment-for-your-environmental-permit> (Accessed 3 May 2022).

<sup>64</sup> East Cheshire Council website (online). Available at: <https://www.cheshireeast.gov.uk/planning/flooding/floods-and-flood-risk/surface-water-management.aspx> (Accessed 3 May 2022).

<sup>65</sup> Cheshire East Council (2022). SuDS Guide. Sustainable Drainage System design guidance for Cheshire East (online). Available at: <https://moderngov.cheshireeast.gov.uk/ecminutes/documents/s87179/App%20A%20Consultation%20Draft%20SuDS%20Guide.pdf> (Accessed 3 May 2022).

| Technical guidance document                                                                              | Context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                          | with multifunctional benefits, i.e. improvements in biodiversity, and enhance landscape character and quality of place. Only where this is not possible will hard engineering solutions be acceptable as part of a surface-water management strategy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Cheshire West and Chester Council (LLFA) - Surface water management and SuDS<sup>66</sup></b>         | This guidance covers sustainable surface water management as a material consideration for planning applications and as the Council's role in managing flood risk is to ensure that major development does not increase the risk of flooding onsite or elsewhere. It provides links to design and technical guidance as well as Council specific guidance. It says that SuDS must be included within the early stages of the site design to incorporate appropriate SuDS within the development and will be required to satisfy technical standards and design requirements in accordance with the D5 SuDS Design Handbook. For brownfield sites, where current infrastructure may be staying in place, runoff should attempt to mimic that of greenfield rates with betterment of at least 30% as a minimum, unless it can be demonstrated that this is unachievable or hydraulically impractical to do so. In addition, links to appendices of application submission and approval checklist, runoff calculator and sustainability matrix are provided. |
| <b>Trafford Council - North West SuDS Pro-forma: Guidance for completing your pro-forma<sup>67</sup></b> | This guidance covers what is needed to submit with a Planning Application for major development or in a Critical Drainage Area. It states that a site-specific FRA should be undertaken where required under the NPPF as well as a Sustainable Drainage Strategy with and the appropriate pro-forma. It gives help and advice on completing the Sustainable Drainage Strategy and SuDS Pro forma and covers impermeable area and existing drainage,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

<sup>66</sup> Cheshire West and Chester Council (2020). Surface water management and Sustainable Drainage Systems (SuDS) (online). Available at:

[https://inside.cheshirewestandchester.gov.uk/policies\\_plans\\_and\\_strategies/planning\\_policy/surface\\_water\\_management\\_and\\_sustainable\\_drainage\\_systems\\_suds](https://inside.cheshirewestandchester.gov.uk/policies_plans_and_strategies/planning_policy/surface_water_management_and_sustainable_drainage_systems_suds) (Accessed 3 May 2022).

<sup>67</sup> Trafford Council (2020). North West SuDS Pro-forma: Guidance for completing your pro-forma (online). Available at:

<https://www.trafford.gov.uk/planning/planning-for-householders/docs/Validation-checklist-NW-SuDS-Pro-forma-guidance.pdf> (Accessed 3 May 2022).

| Technical guidance document                                                         | Context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                                                                                     | <p>peak runoff rates, discharge volume storage, water quality protection, operation and maintenance.</p> <p>This guidance states that if you are proposing to install a new drainage system for surface water management on your development site then your drainage system must be designed to 'greenfield' standards, even if the land has been previously developed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Warrington Borough Council - SuDS Design and Technical Guidance<sup>68</sup></b> | <p>This guidance covers SuDS and their applicability to the Warrington area. It is a detailed guidance giving the approval process, SuDS components and design consideration, SuDS suitability for the Warrington area, general design requirements, technical design requirements and maintenance.</p> <p>It states that for low rainfall there should be no discharge to a surface water body or sewer that results from the first 5mm of any rainfall event. In low permeability soils where this is not achievable, the developer shall demonstrate to Warrington Borough Council that infiltration has been encouraged through the SuDS Management Train. For high rainfall either of the two approaches below must be used to manage the surface runoff discharge unless peak flow rate and volume does not apply and different approaches are set out.</p> |

<sup>68</sup> Warrington Council (2019). Flood Risk Assessment/SuDS Requirements for new developments – checklist (online). Available at: [https://www.warrington.gov.uk/sites/default/files/2019-10/suds\\_guidance\\_approved\\_document\\_0.pdf](https://www.warrington.gov.uk/sites/default/files/2019-10/suds_guidance_approved_document_0.pdf) (Accessed 3 May 2022).

## 7.3 Consultation and engagement

### Overview

- 7.3.1 A summary of the key points of relevance to the water environment from the Environmental Impact Assessment (EIA) Scoping Opinion is provided in **Table 7.4**.

**Table 7.4 Summary of Environmental Impact Assessment Scoping Opinion responses for the water environment**

| Consultee                               | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | How addressed in this PEIR                                                                                                                                                                                                                                   |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>The Planning Inspectorate (PINS)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                              |
| <b>3.3.1</b>                            | <p>Paragraph 7.6.4<br/>Construction and operational phases:</p> <ul style="list-style-type: none"> <li>• Ordinary watercourses upstream or upslope of the Proposed Development;</li> <li>• Ponds and lakes upstream or upslope of the Proposed Development.</li> </ul> <p>The Scoping Report does not include Water Framework Directive surface water bodies (river and transitional), ponds or lakes upstream or upslope of the Proposed Development within the proposed scope of the water environment assessment. The Inspectorate considers that if the Proposed Development would not directly or indirectly affect these water bodies, this matter can be scoped out of the ES.</p> | <p>Surface water features upstream of the Project, not directly and indirectly impacted by the Project have been scoped out within this chapter in <b>Section 7.8</b>. This is reflected within the Study Area boundary definition (<b>Section 7.4</b>).</p> |

| Consultee | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.3.2     | <p>Paragraph 7.6.7</p> <p>The Applicant proposes that biological elements of ecological status for river water bodies (macroinvertebrates and fish) will not be part of future water environment assessments within the ES, however the potential for indirect effects on biology elements which could occur as a direct result of changes to the water quality or the hydromorphology of a water feature, will be part of the future biodiversity assessment, if required. The Inspectorate does not consider that the Scoping Report explains why this matter should be scoped out. In the absence of further justification, an assessment of effects on macroinvertebrates and fish should be provided in the ES.</p>                                                                                        | <p>The potential for indirect effects of changes to water quality or the hydromorphology of a water feature on macroinvertebrates and fish will be addressed within the Biodiversity chapter (<b>Chapter 5</b>). More details are given within <b>Section 7.8</b>. Although closely linked, any deterioration of water quality and to achieve Good Ecological Status in estuaries and rivers are to be addressed within <b>Section 7.10</b> of this chapter whilst potential direct and/or indirect effects on macroinvertebrates and fish is to be undertaken within the Biodiversity chapter. A fully integrated assessment of the impact of the Project on WFD compliance, considering all elements of the WFD classification, is provided in <b>Appendix 7C</b>.</p> |
| 3.3.4     | <p>Paragraph 7.6.21</p> <p>The Applicant proposes that, based on knowledge of the baseline environment, the nature of planned works and existing best practice, together with evidence from other large infrastructure projects, the operation and maintenance activities would not involve dewatering works and therefore no impact on groundwater levels is anticipated. The Inspectorate considers that insufficient evidence has been provided by the Applicant with regards to permanent impacts to groundwater flows and levels, either within the footprint of the Proposed Development or as a result of changes associated with barrier effects caused by buried structures, especially within areas already at risk of flooding. The Inspectorate therefore considers that effects on operational</p> | <p>Effects on groundwater levels during the operational phase will be assessed and included within the PEIR and ES.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Consultee | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|           | groundwater levels cannot be scoped out and this matter should be assessed and included within the ES. The Inspectorate is content that effects during maintenance can be scoped out.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3.3.5     | <p>Paragraph 7.6.22</p> <p>The Applicant proposes that, subject to embedded mitigation (Table 7.10 of the Scoping Report) in place and no routine discharges and/or dewatering operations, there is minimal risk of leakage of hazardous substances to impact surface or groundwater quality. The Inspectorate is content that this matter can be scoped out of further assessment but considers that the ES should provide details of how any water is to be captured, treated and disposed of, especially in proximity to water crossings and with regards to potential dewatering of excavations and trenches.</p>                    | <p>It is noted the PINS agrees that operational phase water quality effects can be scoped out of this assessment. This chapter provides details of how any water is to be captured, treated and disposed of for the construction phase, especially in proximity to water crossings and with regards to potential dewatering of excavations and trenches, within <b>Section 7.7</b> which describes embedded environmental measures.</p>                                                                                                                                    |
| 3.3.6     | <p>Paragraph 7.6.22</p> <p>The Applicant proposes that an assessment of flood risk during the operational phase of the Proposed Development can be scoped out, on the basis that the construction of Hydrogen Above Ground Installation (HAGIs) within Flood Zones 2 and 3 would be avoided as far as possible, and where this cannot be avoided, suitable flood risk mitigation measures would be specified in the Flood Risk Assessment (FRA) and Drainage Strategy. The Inspectorate is content with this approach for buried pipeline infrastructure, however flood risk for above ground development including the HAGIs should</p> | <p>The proposal to scope operational phase flood risk out of the EIA was on the basis that national planning policy requires that avoidance or full mitigation be provided for flood risks for all new development. Although the prospect of likely significant effects on flood risk receptors is low, it is recognised the further flood risk and drainage studies need to be carried out to provide the evidence that flood risk impacts associated with the Project can be fully mitigated. A preliminary FRA and Drainage Strategy for the Project is provided in</p> |

| Consultee    | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | How addressed in this PEIR                                                                                                                                                                                                                                                                        |
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|              | be addressed, including demonstration of any flood protection or resilience measures. The ES should include details of the sequential and exception tests as they have been applied to the Proposed Development.                                                                                                                                                                                                                                                                              | <b>Appendix 7B</b> and summarised in this chapter in <b>Section 7.7</b> .                                                                                                                                                                                                                         |
| <b>3.3.7</b> | Paragraph 7.6.22<br>Flood risk methodology – surface development<br>The Scoping Report proposes that the only surface manifestation of the Proposed Development will be the HAGIs. This is considered to be inconsistent with the Description of the Development and future assessment work should also include, for example, block valve compounds and other relevant forms of surface development.                                                                                          | Flood risk to all aspects of above ground infrastructure is assessed as part of the preliminary FRA ( <b>Appendix 7B</b> ).                                                                                                                                                                       |
| <b>3.3.8</b> | Paragraphs 7.4.39 - 7.4.42<br>The Scoping Report identifies Flood Zones across the Study Area however does not include sub-categories, such as an area of high probability (Flood Zone 3a) or functional floodplain (Flood Zone 3b). The ES should provide an accurate and consistent description of the baseline flood risk for each element of the Proposed Development and the description should clearly distinguish between Flood Zones, including Flood Zones 3a and 3b where relevant. | The chapter and the supporting preliminary FRA ( <b>Appendix 7B</b> ) provide an accurate and consistent description of the baseline flood risk for each element of the Project. <b>Appendix 7B</b> sets out the proposed approach to identifying areas of functional floodplain (Flood Zone 3b). |
| <b>3.3.9</b> | Paragraph 7.4.58<br>The Inspectorate considers that SuDS requirements should be considered in relation to each element of the Proposed Development, including block valve                                                                                                                                                                                                                                                                                                                     | SuDS will be incorporated into project above ground infrastructure, according to the principles set out in the preliminary FRA ( <b>Appendix 7B</b> ). Further work will be carried out on the development of a Drainage                                                                          |

| Consultee | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                           |
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|           | compounds where proposed and the Cathodic Protection (CP) system, where the drainage environment is likely to be affected. The Applicant make effort to agree the location, design and management of SuDS for the Proposed Development with relevant consultation bodies and evidence this within the ES.                                                                                                                                                                                                                                                                                                    | Strategy for the final Development Consent Order (DCO) FRA.                                                                                                                                                                                                                                                                                                          |
| 3.3.10    | <b>Table 7.11</b><br>For the avoidance of doubt, the ES should include consideration of the impacts from bentonite breakout during Horizontal Directional Drilling (HDD) works on aquatic environment receptors and water resource receptors.                                                                                                                                                                                                                                                                                                                                                                | The chapter considers the potential impacts from bentonite breakout during HDD works and mitigation to prevent impacts on aquatic environment receptors and water resource receptors within <b>Section 7.10</b> .                                                                                                                                                    |
| 3.3.11    | <b>Table 7.12</b> of the Scoping Report does not include a 'Very High' category of receptor sensitivity, as might be expected when applying an approach informed by the Design Manual for Roads and Bridges (DMRB). This has the potential to undervalue or underestimate significance of effect. Where the assessment deviates from established guidance, the Applicant should ensure that this is clearly stated and suitably justified in the ES. The Applicant should seek agreement with the relevant consultation bodies regarding the methodology used in the assessment and evidence this in the ES. | In terms of the definition of classes of receptor sensitivity/ magnitude of change/impact significance we have aligned with the overall EIA methodology as appropriate. Agreement has been sought with the relevant consultation bodies regarding the methodology used in the assessment and evidence of this will be provided within the ES ( <b>Section 7.3</b> ). |

| Consultee                          | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| 3.3.12                             | The ES should outline any impact of the Proposed Development on nutrient levels and, where relevant, any strategic solutions for nutrient neutrality or Diffuse Water Pollution Plans which may be being developed or implemented, to mitigate and address the impacts of elevated nutrient levels. The Applicant's attention is drawn to the consultation response from Natural England in this regard (see Appendix 2 of this Opinion).                                                                                                                                                                                     | The Project would not introduce any new long-term sources of nutrients into the environment. During construction, potential effects associated with foul water arisings from worker facilities and disturbance of nutrients already present in agricultural soils will be assessed. However, it is expected that these impacts would be fully mitigated through the implementation of standard construction good practice (see <b>Table 7.15</b> ). |
| <b>Acton Bridge Parish Council</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Page 1, Para 8                     | 4. The pipeline and Central Hub are potentially going to be sited in an area, or extremely close to an area, that is prone to flooding. As recently as January 2021 storm Christoph meant that around 30 homes, including in cottages on Warrington Road, Acton Bridge and bungalows on Sandy Lane, Weaverham were extensively damaged. Homes had to be evacuated and a great deal of the surrounding land was also submerged. The Parish Council would like to understand what mitigations will be in place to ensure that flooding will not have any impact on the integrity and security of the pipes and the Central Hub. | The intersection of baseline flood risk and project infrastructure in and around Acton Bridge is assessed in the <b>Appendix 7B</b> preliminary FRA. This will be subject to further assessment in the final DCO FRA.                                                                                                                                                                                                                               |
| <b>Canal &amp; River Trust</b>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Consultee                          | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | How addressed in this PEIR                                                                                                                                                                                                                                                                    |
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| <b>Page 3, Para 1</b>              | The route corridors could impact a number of watercourses and ditches which passes under our waterways via culverts, or in some instance may even discharge into the canals. These would need to be located and protected to ensure the potential for silty waters or contaminants entering the canal is mitigated. Our records indicate that there are a lot of culverts in this area, many of which may be sewers or combined sewers and which may cross the proposed line of the pipeline depending on the final route corridor. | A number of canal water bodies have been identified as potential receptors for effects, as noted in <b>Section 7.8</b> . Embedded measures to minimise the ingress of suspended sediments and contaminants into surface watercourses (including canals) are identified in <b>Table 7.15</b> . |
| <b>Page 3, Para 2</b>              | The details of how any water is to be captured, treated and disposed of should be considered especially in proximity to the water crossings, especially in terms of dewatering excavations and trenches. Regard would also need to be given to run-off and surface water discharge from the construction compounds.                                                                                                                                                                                                                 | An overview of proposed embedded measures to manage the quality and quantity of runoff and dewatered groundwater from project construction is provided in <b>Table 7.15</b> .                                                                                                                 |
| <b>Page 3, Para 4</b>              | Any impact on the canal from drainage or flood risk should be included within the ES as this could affect both water quality and quantity and have a wider impact on our network.                                                                                                                                                                                                                                                                                                                                                   | The approach to managing flood risk and drainage for the Project, including potential impacts on canal receptors, is set out in <b>Appendix 7B</b> .                                                                                                                                          |
| <b>Cheshire East Council (CEC)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                               |
| <b>Flood risk, para 1</b>          | With reference to SuDS page 152-153. We would note that we do have emerging CEC specific SuDS documentation in draft which should be considered for inclusion.                                                                                                                                                                                                                                                                                                                                                                      | The emerging CEC specific SuDS documentation has been requested and relevant aspects summarised within <b>Section 7.2</b> of this chapter.                                                                                                                                                    |

| Consultee                                       | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | How addressed in this PEIR                                                                                              |
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| <b>Flood risk, para 2</b>                       | <b>Section 7.3</b> also confirms the importance and need to consult with LLFA at appropriate time concerning detail and the need to obtain appropriate consents/approvals for detailed design and construction works.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Consultation with all LLFAs will be carried out as required in the process of preparation of the final DCO EIA and FRA. |
| <b>Cheshire West and Chester Council (CWCC)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                         |
| <b>Water Environment, para 1</b>                | <p>The Lead Local Flood Authority (LLFA) is in general agreement with the Scoping Reports proposed assessment requirements outlined within Section 7 of the Scoping Report, but do raise the specific comments:</p> <ul style="list-style-type: none"> <li>• Flood risk assessment and drainage strategy should be included for all aboveground installations (HAGIs and block valves) and in addition mitigation where in Flood risk zones 2 and 3.</li> <li>• Mitigation measures should be provided for any trenched crossing of 'ordinary' watercourses.</li> <li>• Provision of a groundwater risk assessment of longitudinal below ground structures.</li> <li>• Consideration of above ground layout in respect the retention of overland flow routes, including surface water management plans (inc hydraulic calculations) and SuDS.</li> </ul> <p>For information, the full comments of the LLFA referred to below</p> | This is noted and responses to each individual reference within the preliminary FRA (Appendix 7B)..                     |
| <b>Page 1, para 1</b>                           | The proposal is to scope in water to consider impacts on the surface water and groundwater receptors to include Main Rivers, Ordinary Watercourses and WFD water bodies. We are in agreement with the proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | This is noted and responses to each individual reference are given below against each comment.                          |

| Consultee             | Consideration                                                                                                                                                                                                                                                                                                          | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                   |
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|                       | assessment requirements, but have the following specific comments:                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                              |
| <b>Page 1, para 2</b> | Above ground installations, block valve stations and compound areas will require a flood risk assessment and drainage strategy in accordance with NPPF. Where development is proposed within Flood Zone 2 and 3 mitigation measures should be provided in accordance with NPPF and Environment Agency standing advice. | The preliminary FRA ( <b>Appendix 7B</b> ) covers flood risk aspects to above ground installations, block valve stations and compound areas. This identifies where above ground infrastructure is proposed within Flood Zone 2 and 3, and sets out the approach to development of mitigation measures for the final DCO FRA.                 |
| <b>Page 1, para 4</b> | Potential for increased groundwater flood risk up gradient of longitudinal below ground structures should be assessed and mitigation measures provided to manage any temporary and permanent groundwater emergence at the surface.                                                                                     | The potential for increased groundwater flood risk up gradient of longitudinal below ground structures is assessed. Mitigation measures are identified to manage any temporary and permanent groundwater emergence at the surface, as considered within <b>Section 7.7</b> and in the <b>Appendix 7B</b> preliminary FRA.                    |
| <b>Page 1, para 5</b> | The proposed development is generally within an area at low risk of surface water flooding but there are parts of the development which are at medium to high risk of surface water flooding which need to be considered as part of the above ground layout to ensure any overland flow routes are retained.           | An assessment of the intersection of the Project with overland flow pathways is given within preliminary FRA ( <b>Appendix 7B</b> ). Above ground infrastructure would be avoided in areas of medium to high surface water flood risk wherever possible, and mitigation measures proposed in the final DCO FRA where this cannot be avoided. |

| Consultee              | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                 | How addressed in this PEIR                                                                                                                                                                                                                                                                                                |
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| <b>Page 1, para 6</b>  | <p>Surface water management for the above ground works needs to follow the drainage hierarchy:</p> <ul style="list-style-type: none"> <li>- Infiltration into ground</li> <li>- Connection to the watercourse</li> <li>- Connection to discharge water sewer and as a last resort;</li> <li>- Connection to the combined sewer.</li> </ul>                                                                                                    | The hierarchy is noted and has been taken into account when developing drainage strategies for above ground infrastructure, as discussed in the preliminary FRA ( <b>Appendix 7B</b> ).                                                                                                                                   |
| <b>Page 1, para 7</b>  | <p>SuDS should be designed to control surface water as close to its source as possible. Well designed sustainable drainage systems also provide opportunities to:</p> <ul style="list-style-type: none"> <li>- reduce the causes and impacts of flooding,</li> <li>- remove pollutants from urban run-off at source,</li> <li>- combine water management with green space providing benefits for amenity, recreation and wildlife.</li> </ul> | The statutory planning policy requirements and best practice guidance recommendation for the use of SuDS in drainage systems for new developments will be taken into account when developing drainage strategies for the Project including conditions stated, as discussed in the preliminary FRA ( <b>Appendix 7B</b> ). |
| <b>Page 1, para 8</b>  | The use of SuDS should also help achieve the sustainability objectives of the National Planning Policy Framework (NPPF).                                                                                                                                                                                                                                                                                                                      | Response as above.                                                                                                                                                                                                                                                                                                        |
| <b>Page 1, para 9</b>  | The suitability of sustainable drainage systems should be assessed in accordance with paragraphs 051, 079 and 080 of the revised NPPF Planning Practice Guidance for Flood Risk and Coastal Change ( <a href="https://www.gov.uk/guidance/flood-risk-and-coastal-change">https://www.gov.uk/guidance/flood-risk-and-coastal-change</a> ).                                                                                                     | Response as above.                                                                                                                                                                                                                                                                                                        |
| <b>Page 1, para 10</b> | Sustainable drainage systems should be designed in line with national Non-Statutory Technical Standards for SuDS                                                                                                                                                                                                                                                                                                                              | Response as above.                                                                                                                                                                                                                                                                                                        |

| Consultee                                   | Consideration                                                                                                                                                                                                                                                                                                                                                                 | How addressed in this PEIR                                                                                                                                              |
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|                                             | ( <a href="https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards">https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards</a> ) and local policies ENV1, DM40, DM41, DM42 and DM43 of the Core Strategy                                                                 |                                                                                                                                                                         |
| <b>Page 2, Para 1</b>                       | Surface water attenuation requirements should be assessed that offer a reduction in surface water runoff rate in line with the Policy DM 41 (i.e. at least 30% betterment on brownfield flows and greenfield runoff for existing greenfield sites). Please note that all new connections to the watercourses shall comply with reduction of flows to greenfield runoff rates. | Surface water attenuation requirements for drainage for construction and operational phase infrastructure are identified in the preliminary FRA ( <b>Appendix 7B</b> ). |
| <b>Page 2, Para 2</b>                       | Surface water should be managed to ensure there is no increased surface water from the proposed development and runoff from extreme events should be managed such that adjacent third party land is not affected.                                                                                                                                                             | Response as above.                                                                                                                                                      |
| <b>Environment Agency</b>                   |                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                         |
| <b>Decommissioning, para 3</b>              | For works impacting non main watercourses, we recommend contact is made with the relevant lead local flood authorities which in the case of this scheme are the local planning authorities the pipeline will travel through.                                                                                                                                                  | Consultation with all LLFAs will be carried out as required in the process of preparation of the final DCO EIA and FRA.                                                 |
| <b>Chapter 7. Water Environment, para 1</b> | The overall scope of this chapter is generally acceptable providing the following observations/recommendations are considered and included.                                                                                                                                                                                                                                   | Responses given below:                                                                                                                                                  |

| Consultee                                   | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Chapter 7. Water Environment, para 2</b> | Paragraph 7.4.59 & 7.4.60, page 181, describes how Water Framework Directive change will be considered with paragraph 7.4.60 stating 'It may be appropriate to assess construction related effects against the existing baseline surface water environment, however potential operational effects should take account of a future baseline environment that assumes Good Ecological Status/Potential will be attained during the lifetime of the Project'. The construction of any new modifications to rivers will also need to consider long term impact(s) on achieving Water Framework Directive Good Ecological Status or Good Ecological Potential. | The consideration of long-term impact(s) on achieving Water Framework Directive "Good" ecological status or "Good" ecological potential construction of any new modifications to rivers is given within <b>Appendix 7C</b> .                                                                                                                                                                                                                                                                                                                                                            |
| <b>Chapter 7. Water Environment, para 3</b> | <b>Table 7.12</b> , page 192, provides definitions of receptor sensitivity to be used in the assessment with examples of receptors placed in each class, including the following 'very low' sensitivity receptor.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Response given below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Chapter 7. Water Environment, para 4</b> | While there are a lot of heavily modified water bodies within our operational area and can agree some could be considered as low-quality habitat, the approach should be to ensure they do not deteriorate further as part of the scheme. Indeed, we would recommend opportunities need to be taken to reduce modifications wherever possible.                                                                                                                                                                                                                                                                                                            | This comment relates to the example provided of a 'Very low' sensitivity receptor above. The example is not intended to include all artificial or heavily modified watercourses. It is acknowledged that some water bodies designated as artificial water bodies (AWBs) or heavily modified water bodies (HMWBs) in River Basin Management Plans (RBMPs) could be accorded a higher receptor sensitivity. The wording of the example has been changed accordingly within <b>Section 7.9 (Table 7.19)</b> . The WFD requirement to ensure no deterioration of ecological status is noted |

| Consultee                                   | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | How addressed in this PEIR                                                                                                                                         |
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|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | and will be assessed as part of the EIA ( <b>Appendix 7C</b> ).                                                                                                    |
| <b>Chapter 7. Water Environment, para 5</b> | An assessment of the risk of Water Framework Directive water body status deterioration would seem appropriate for inclusion. If deterioration is considered likely, the Environmental Statement must address how these impacts will be avoided, minimised and/or mitigated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Response given above.                                                                                                                                              |
| <b>Chapter 7. Water Environment, para 6</b> | It should be noted the Scoping Report does not appear to contain specific reference to Water Framework Directive mitigation measures associated with Heavily Modified Water bodies. (These must not to be confused with measures to mitigate environmental effects from the development proposal). Paragraph 7.6.7, page 187, states the intention to assess the effects on Water Framework Directive biological elements as a direct result of hydromorphology changes, which we support. However, the Environmental statement must also assess whether any of the development proposals prevent any heavily modified water body mitigation measure being completed, because this would prevent the legal objective of 'good ecological potential' for that heavily modified water body. | A full assessment of impacts on AWBs and HMWBs will be included in the EIA, including effects on RBMP mitigation measures ( <b>Appendix 7C</b> ).                  |
| <b>Chapter 7. Water Environment, para 7</b> | We can provide a list of the mitigation measures identified for each heavily modified water body affected by the proposed development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Mitigation measures in reference to the RBMP to improve the quality of HMWBs have been requested from the EA ( <b>Section 7.3 – Consultation and engagement</b> ). |

| Consultee                                   | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                              | How addressed in this PEIR                                        |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Chapter 7. Water Environment, para 9</b> | The 'high' magnitude example must also reference to not achieving Good Ecological Potential as well as Good Ecological Status.                                                                                                                                                                                                                                                                                                             | Agreed and changes given within <b>Section 7.9 (Table 7.20)</b> . |
| <b>Marine Management Organisation (MMO)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                   |
| <b>3.4 Coastal Processes, 3.4.1</b>         | The MMO notes that the scoping report identifies all the potential impacts of the project on coastal processes receptors.                                                                                                                                                                                                                                                                                                                  | Noted, no further response required.                              |
| <b>3.4 Coastal Processes, 3.4.2</b>         | The MMO is satisfied that the embedded mitigation and management measures outlined in this report are sufficiently identified to tackle potential climate impacts of the project.                                                                                                                                                                                                                                                          | Noted, no further response required.                              |
| <b>3.6 Underwater noise, 3.6.1</b>          | The MMO note that within the Study Area, the main rivers can be divided into three Water Framework Directive (WFD) Management Catchments, the Upper and Lower Mersey and the Weaver Gow. Within these are eight operational catchments, each containing multiple Main Rivers. The key Main Rivers within the Study Area are the Weaver, Dane, Manchester Ship Canal (classed as a Main River in parts), Bollin and Mersey (section 7.4.8). | Noted, no further response required.                              |
| <b>Natural England</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                   |

| Consultee                           | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water Quality</b>                | <p>The planning system plays a key role in determining the location of developments which may give rise to water pollution, and hence planning decisions can have a significant impact on water quality, and land. The assessment should take account of the risks of water pollution and how these can be managed or reduced. A number of water dependent protected nature conservation sites have been identified as failing condition due to elevated nutrient levels and nutrient neutrality is consequently required to enable development to proceed without causing further damage to these sites. The ES needs to take account of any strategic solutions for nutrient neutrality or Diffuse Water Pollution Plans, which may be being developed or implemented to mitigate and address the impacts of elevated nutrient levels. Further information can be obtained from the Local Planning Authority.</p> | <p>The Project would not introduce any new long-term sources of nutrients into the environment. During construction, potential effects associated with foul water arisings from worker facilities and disturbance of nutrients already present in agricultural soils will be assessed. However, we expect these impacts to be fully mitigated through the implementation of standard construction good practice (see <b>Table 7.15</b>).</p> |
| <b>St Helens Borough Council</b>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Water Environment, para 3/ 4</b> | <p>The Lead Local Flood Authority have commented as below:</p> <ul style="list-style-type: none"> <li>• The applicant has identified several watercourses in the scoping area which are all named main rivers, however there is a chance there will be several unnamed ordinary watercourses and historic culverts within the area which need to be assessed as the scheme develops; and</li> <li>• As the scheme progresses the LLFA should be contacted with the details in this review to assist with</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                 | <p>The EIA baseline will take into account unnamed ordinary watercourses and historic culverts within the area and these will be assessed as appropriate. The LLFA will be consulted during preparation of the final DCO EIA and FRA to review possible watercourse and/or culvert assets as well as the appropriate application of Drainage Byelaws and 8m easements to cover works near ordinary watercourses.</p>                         |

| Consultee                        | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                      |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | possible watercourse/culvert assets. As a Council they do have land Drainage Byelaws in place which cover works near ordinary watercourses and contains 8m easements.                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                 |
| <b>Water Environment, para 5</b> | In the scoping report it refers to St Helens Council Preliminary Flood Risk Assessment (PFRA 2011) which they accessed on the 21st November 2021, this is now outdated, there is a St Helens Council Preliminary Flood Risk Assessment 2017-23 version (PFRA 2017-23), they will need to reference this document instead. St Helens Council now has adopted SuDS guidance document and checklist which needs to be followed, further details of the guidance is provided within this review. The Councils climate value for the area is set at 40%. | Reference to the St Helens Council Preliminary Flood Risk Assessment 2017-23 version (PFRA 2017-23) is made within <b>Appendix 7B</b> . The latest SuDS guidance doesn't appear to be available on their website, but this will be requested via the consultee engagement process prior to developing HAGI drainage strategies for the DCO FRA. |
| <b>Water Environment, para 6</b> | The documents identified above are all available in the web link below or contacting the LLFA with the details provided in this review. These documents will need to be referenced in any assessment. <sup>69</sup>                                                                                                                                                                                                                                                                                                                                 | Documents are referenced within <b>Section 7.2</b> .                                                                                                                                                                                                                                                                                            |
| <b>Trafford Council</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                 |
| <b>Water Environment, para 1</b> | The scoping boundary within Trafford predominantly includes land within Environment Agency Flood Zone 1, although the River Bollin and the Red Brook, Sinderland Brook and Caldwell Brook and land adjacent to these                                                                                                                                                                                                                                                                                                                                | This is noted within <b>Appendix 7B</b> and shown within <b>Figure 7.7</b> .                                                                                                                                                                                                                                                                    |

<sup>69</sup> This online link provided by the St Helens Borough Council is not working at the time of writing. <https://www.sthelens.gov.uk/traffic-travel-parking/highway-maintenance/flooding-and-drainage/floodand-water-management/>

| Consultee                         | Consideration                                                                                                                                                                                                                                                                                                                                                                           | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | watercourses is within Flood Zones 2 and 3. The area is not within the Critical Drainage Area identified in the Manchester, Salford and Trafford Level 2 Hybrid SFRA.                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Water Environment, para 2</b>  | The Lead Local Flood Authority (LLFA) comment they are encouraged to see the pipeline where possible will be completely underground and a Flood Risk Assessment and Drainage Strategy will be submitted considering the NPPF, Section 5.7 of the overarching National Policy Statement for Energy and the Trafford Local Plan Core Strategy.                                            | The preliminary FRA and drainage strategy is provided in <b>Appendix 7B</b> and the NPPF, Section 5.7 of the overarching National Policy Statement for Energy and the Trafford Local Plan Core Strategy have been considered in <b>Section 7.2</b> .                                                                                                                                                                                                                                             |
| <b>Water Environment, para 3</b>  | The LLFA advise that they would prefer directional drilling when the route crosses a watercourse, and any such crossings should be a minimum of 1m below the hard bed level of the watercourse. Open cut crossings on ordinary watercourses will require the prior written Land Drainage Consent of the LLFA. With regards to this point they will need to see details of each crossing | A watercourse crossing schedule and locations where open cut crossings will be required are identified within <b>Chapter 2: The Project</b> and the Crossing Schedule within <b>Appendix 2A</b> . The methodology for directional drilling is given within <b>Chapter 2</b> . It is anticipated the applications for individual Land Drainage Consents (generally referred to as ordinary watercourse consents, or OWCs in this document) would be made by the contractor post grant of the DCO. |
| <b>Water Environment, para 4</b>  | The Environment Agency will also need to be consulted on the Scoping Opinion and on the application for a DCO                                                                                                                                                                                                                                                                           | See the Environment Agency consultation and response within this chapter <b>Table 7.4</b> .                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Warrington Borough Council</b> |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Consultee                                                   | Consideration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | How addressed in this PEIR                                                                                                                            |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water Environment, para 2/ Water Environment, para 3</b> | A response has been received from the Lead Local Flood Authority received and the full response will be attached to this response but they are also summarised below:<br>· section 1.6 of the report it states that a Flood Risk Assessment (FRA) will be submitted and that the FRA will assess the flood risk both to and from the Project and demonstrate how flood risk will be managed over the Projects lifetime and give regard to climate change the route of the pipeline will be in areas at risk of flooding and this needs to be addressed in the FRA. | The preliminary FRA is provided in <b>Appendix 7B</b> .                                                                                               |
| <b>Water Environment, para 4</b>                            | It is appreciated that a consultation will be undertaken with the LLFA and the Environment Agency to discuss the effects of the proposal on the water environment. For works within the rivers you will also need a Marine Licence.                                                                                                                                                                                                                                                                                                                                | Consultation with the LLFA, MMO and the Environment Agency for works associated with rivers and other water bodies is ongoing ( <b>Section 7.3</b> ). |
| <b>Water Environment, para 5</b>                            | Much of the Warrington Area is classed as an area of critical drainage so is liable to flooding and is located in Flood Zones 1, 2 and 3. Penketh, Warrington Town Centre and the surrounding areas have been flooded recently. It is recommended that more work be undertaken in relation to surface water flood risk to Warrington as no mention is made of it within this section.                                                                                                                                                                              | Surface water flood risk within Warrington is dealt with in the preliminary FRA in <b>Appendix 7B</b> .                                               |
| <b>Water Environment, para 6</b>                            | It is agreed that the Canal and Rivers Trust and Peel Ports should be consulted as part of the process.                                                                                                                                                                                                                                                                                                                                                                                                                                                            | See the Canals and Rivers Trust and MMO consultation and response within this <b>Table 7.4</b> .                                                      |

| Consultee                        | Consideration                                                                                                                                                                                                                                                                                                                                          | How addressed in this PEIR                                                                                                                                                                                 |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water Environment, para 7</b> | There is also currently Flood Defence work being undertaken in the Scoping Area and this should not be affected.                                                                                                                                                                                                                                       | Flood defence works are considered within the preliminary FRA <b>Appendix 7B</b> and further details will be sought via ongoing consultation with the Environment Agency and LLFAs ( <b>Section 7.3</b> ). |
| <b>Water Environment, para 8</b> | It is welcomed that the application would be submitted with a FRA.                                                                                                                                                                                                                                                                                     | The preliminary FRA is provided in <b>Appendix 7B</b> .                                                                                                                                                    |
| <b>para 1</b>                    | The Asset & Flood Risk Team have reviewed the EIA Scoping Report and in section 1.6 of the report it states that a Flood Risk Assessment (FRA) will be submitted and that the FRA will assess the flood risk both to and from the Project and demonstrate how flood risk will be managed over the Projects lifetime and give regard to climate change. | The preliminary FRA is provided in <b>Appendix 7B</b> .                                                                                                                                                    |
| <b>para 2</b>                    | The route of the pipeline will be in areas at risk of flooding and this will need to be addressed in the FRA.                                                                                                                                                                                                                                          | The preliminary FRA is provided in <b>Appendix 7B</b> .                                                                                                                                                    |

## Technical engagement

- 7.3.2 Technical engagement with consultees in relation to the water environment is ongoing. A summary of the technical engagement undertaken to date is outlined in **Table 7.5**.
- 7.3.3 Consultation will be held with relevant statutory and non-statutory organisations as necessary and as part of the wider stakeholder engagement programme. This will include the Environment Agency and LLFAs, and other local authorities<sup>70</sup> as appropriate. Other consultees will include the Canal and Rivers Trust and Peel Ports, who own Manchester Ship Canal. Embedded environmental measures have been developed in consultation with the wider environment team and engineering design team to ensure that the best environmental and technically feasible option for the proposed infrastructure is selected.
- 7.3.4 In addition, support will also be given to consultation led by other disciplines as required, for example this could include supporting terrestrial ecology consultation with Natural England. Engagement with relevant stakeholders will be ongoing during the preparation of the ES submissions to supplement desk-based analysis and site-based observations, as the assessment of potential effects on water environment progresses.
- 7.3.5 The Environment Agency has confirmed that for ground investigation (GI) works there are no specific permit requirements except FRAP for works in fluvial floodplains and in the vicinity of main rivers and flood defences<sup>71</sup>. An OWC would also need to be sought from LLFAs should works be proposed within byelaw stand-off distances from ordinary watercourses. As far as abstraction licensing and environmental permitting are concerned, no permissions to drill a borehole for site investigation or environmental monitoring purposes are required provided that it is not intending to abstract water (at a rate of 20m<sup>3</sup>/day or greater) or discharging any substances or effluent to ground or groundwater<sup>72</sup>.
- 7.3.6 The Environment Agency has also confirmed that for the construction of shafts for river, road or railway crossings the need to dewater excavations should be accompanied by further consultation, regarding abstraction rates and related issues, as soon as possible.
- 7.3.7 Consultation will be undertaken with the LLFAs to discuss the effects of the proposal on the water environment and aspects of surface water flood risk and drainage to inform the preparation of the final DCO FRA and Drainage Strategy.

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<sup>70</sup> Comprising: District Borough Unitary Districts: St. Helens District; Halton District; Warrington District; Trafford District; Salford District, Knowsley District, Cheshire East District and Cheshire West and Chester District.

<sup>71</sup> FRAP permits for any works with 8/ 16 of Main River banktop and landward toe of a flood defence structure respectively.

<sup>72</sup> Personal communication: e-mail from Stephen Sayce (EA, Strategic Planning) 11 and 13 May 2022 (stephen.sayce@environment-agency.gov.uk)

Table 7.5 Technical engagement on the environmental aspect assessment

| Consultee          | Consideration                                                        | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment Agency | Initial pre-PEIR engagement discussion, 13 June 2022 <sup>73</sup> . | <p>Points agreed during the meeting are summarised below:</p> <ul style="list-style-type: none"> <li>• Environment Agency agrees Wood's proposed responses to its scoping comments;</li> <li>• Agreed Wood is to prepare Construction Management Plans detailing best practice prior to the DCO application with final versions developed post DCO with details of construction proposals;</li> <li>• There will be limited requirements for abstraction during construction and some pre-commissioning water requirements. Agreed that any abstraction licence would depend on water availability and earlier consultation with the Environment Agency, regarding abstraction rates and related issues, is anticipated;</li> <li>• Agreed that most of the focus of flood risk will be on the temporary rather than permanent features, such as temporary storage of excavated material within the flood plain and early sight of the proposals to agree general constraining parameters is advised during the PEIR process;</li> </ul> |

<sup>73</sup> Wood (June 2022). 'Water Environment Liaison Meeting with the Environment Agency' (EA). Minutes of meeting 13 June 2022, Teams Teleconference.

| Consultee | Consideration | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |               | <ul style="list-style-type: none"><li>• Likely significant effects from operations have been largely scoped out since there will be no routine discharges and minimal impacts by HAGIs (except subsurface flow pathway impacts) and this approach has been agreed with the Environment Agency;</li><li>• Proposed project activities are shown with only operation and maintenance being screened out for WFD assessment. Embedded mitigation to reduce WFD hydromorphological and ecological effects are shown with no objections raised to the methodology or approach at this stage;</li><li>• Agreed that the Environment Agency does not require compensatory storage to be required for ground raising in tidal flood risk areas, or in defended areas;</li><li>• Agreed that there are no plans to disapply Environment Agency or LLFA permitting powers as part of DCO and the Environment Agency will therefore retain ability to scrutinize detailed proposals for environmental management of the Project post-DCO (primarily applies to construction phase).</li></ul> |

| Consultee               | Consideration                                                                                                                                                                                                                | How addressed in this PEIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>United Utilities</b> | Water Environment Liaison Meeting with the United Utilities (UU), 17 June 2022 <sup>74</sup> : Meeting to discuss interactions of Hynet project on UU assets and interests, particularly with regard to groundwater impacts. | <p>Baseline development of public water supply abstractions and methodology to screening and risk assessment.</p> <p>Points agreed during the meeting and actions are given below:</p> <ul style="list-style-type: none"> <li>• Wood to develop a formal screening approach and methodology to groundwater protection;</li> <li>• A future meeting to cover asset protection is agreed to be setup;</li> <li>• Wood agree with UU scoping comments within their consultation response dated 5 May 2022;</li> <li>• Wood agree there are costs associated with UU asset protection work, details of which are to be agreed in future.</li> </ul> |

<sup>74</sup> Wood (June 2022). 'Water Environment Liaison Meeting with the United Utilities (UU). Minutes of meeting 17 June 2022, Teams Teleconference.

## Planned future engagement

- 7.3.8 Further engagement with key consultees for the water environment will take place following Section 42 Consultation. The scope details of this further engagement will be determined by responses to the Section 42 Consultation and the requirements of the evolving project design. However, as a minimum, we envisage further meetings with the Environment Agency and UU, as well as engagement with LLFAs, Peel Ports and the Canals and Rivers Trust.

## 7.4 Scope of the Study

### Spatial scope

- 7.4.1 The spatial scope of the hydrological study can be defined by three distinct boundaries (**Figure 7.1**).
- 7.4.2 Firstly the Preliminary Order Limits for the Project, as defined in **Chapter 2: The Project** is the area where direct effects may occur on the water environment by construction activities and works.
- 7.4.3 Secondly, the water environment Study Area has been defined to include all surface WFD water body catchments intersected by the Preliminary Order Limits, in recognition of the WFD being the most overarching applicable regulatory framework for these studies (management and monitoring of the hydrological environment is most commonly assessed at a water body scale). The Study Area identifies the spatial extent for which baseline characterisation, and identification of potential WFD water body receptors (and groundwater abstractions) for the water environment assessment has been carried out. It also defines the Study Area for the WFD compliance assessment in **Appendix 7C**.
- 7.4.4 Finally, a hydrological Zone of Influence (Zoi) has been defined to identify potential receptors for direct effects arising from the Project via a surface water pathway on watercourses, surface water abstractions/discharges and water-dependent conservation sites. For surface water bodies and other receptors, this Zoi extends 500m upstream and 2.5km downstream of the intersection with the Preliminary Order Limits. The buffer upstream is to capture any possible “backing up” influences that may occur during works. The zone downstream of the Preliminary Order Limits is considered to be a reasonable distance over which effects might be expected to occur via transmission in river flows traversing and runoff arising from the Preliminary Order Limits. Beyond this distance downstream, it is considered that effects would become negligible by virtue of dilution, dispersion and degradation effects within watercourses.
- 7.4.5 A screening exercise for potential receptors (covering WFD water bodies, water dependent conservation sites and abstractions) based on this Study Area and surface water Zoi is presented in **Appendix 7A**.

## Temporal scope

- 7.4.6 The temporal scope of the assessment of effects on the water environment is consistent with the period over which the Project would be carried out and therefore covers the construction, operation and maintenance and decommissioning phases as set out in **Chapter 4**. In summary:
- the maximum construction duration is anticipated to take approximately four years;
  - the operational lifetime of the Project is expected to be around forty years; and
  - the timing of the decommissioning is itself more uncertain but it is assumed that decommissioning works would take between one to three years.
- 7.4.7 Water environment effects arising from the Project are not expected to persist beyond the lifetime of the Project, provided all embedded environmental measures are adopted (as set out in **Table 7.15**).

## 7.5 Data gathering methodology

- 7.5.1 Data collection has been undertaken to obtain information on the baseline water environment within the Study Area and ZOI defined in **Section 7.4**. The current baseline conditions presented in **Section 7.6** are based primarily on a desk-study exercise undertaken in May 2022.
- 7.5.2 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 7.6**.

**Table 7.6 Data sources used to inform the water environment assessment**

| Source                                    | Date        | Summary                                                                                                                                             |
|-------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ordnance Survey (OS)</b>               | 05 May 2022 | OS topographic maps 1:25,000 and 1:50,000 scale <sup>75</sup><br>Identification of topography, watercourses, springs, lakes and other watercourses. |
| <b>Meteorological Office (Met Office)</b> | 05 May 2022 | Rainfall data, climate averages and locations of stations <sup>76</sup>                                                                             |

<sup>75</sup> Microsoft (2021). Bing maps. Images courtesy of OS. Available at: <https://www.bing.com/maps> (Accessed 15 November 2021).

<sup>76</sup> Met Office (2021). UK climate averages. Available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcx57w9fb> (Accessed 19 November 2021).

| Source                                        | Date        | Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Environment Agency, Defra</b>              | 05 May 2022 | <p>Environment Agency spatial datasets available from the Data Services Platform<sup>77</sup></p> <p>Data including:</p> <ul style="list-style-type: none"> <li>• Flood Map for Planning;</li> <li>• Statutory Main River Map;</li> <li>• WFD Groundwater Bodies;</li> <li>• WFD Surface Water bodies;</li> <li>• WFD Transitional and Coastal Catchments;</li> <li>• Canal Water bodies;</li> <li>• Groundwater Dependent Terrestrial Ecosystems (GWDTE); and</li> <li>• Groundwater Source Protection Zones (SPZ).</li> <li>• Long term flood risk service.</li> </ul> <p>WFD water body status from the Environment Agency Catchment Data Explorer<sup>78</sup></p> |
| <b>Centre for Ecology and Hydrology (CEH)</b> | 05 May 2022 | <p>Summary river flow statistics for Environment Agency flow gauges and catchment rainfall maps from the online National River Flow Archive (NRFA)<sup>79</sup></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>British Geological Survey (BGS)</b>        | 05 May 2022 | <p>Geological mapping and observation borehole data from the BGS Geology of Britain Viewer, the BGS Onshore GeoIndex, BGS Memoirs and the 1:625,000<sup>80</sup>,</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

<sup>77</sup> Environment Agency (2021). Data.gov portal. (online). Available at <https://environment.data.gov.uk/> (Accessed 15 November 2021).

<sup>78</sup> Environment Agency (2021). Catchment Data Explorer. (online). Available at: <https://environment.data.gov.uk/catchment-planning/> (Accessed 15 November 2021).

<sup>79</sup> Centre for Ecology and Hydrology, (2021). National River Flow Archive. (online). Available at: Search Data | National River Flow Archive (ceh.ac.uk) (Accessed 15 November 2021).

<sup>80</sup> British Geological Survey (2021) Geology of Britain viewer (classic). (online). Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed 15 November 2021).

| Source               | Date       | Summary                                                                                                                                                                                                                                       |
|----------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |            | 1:50,000 <sup>81</sup> , 1:10,000 <sup>82</sup> scale<br>Hydrogeological Map of England and Wales<br>Hydrogeological map of Clwyd and the Cheshire Basin                                                                                      |
| Defra                | 5 May 2022 | Interactive maps from the Multi-Agency Geographic Information for the Countryside (MAGIC) natural environment map viewer <sup>83</sup><br>Including statutory and non-statutory designated nature conservation sites and aquifer designations |
| Cranfield University | 5 May 2022 | Landis Soilscales Map <sup>84</sup><br>Information on Soil types                                                                                                                                                                              |

## Survey work

- 7.5.3 No field monitoring or GI has been undertaken to date. Future site walkover surveys will be carried out at key locations to inform the ES stage of the assessment.

## Data limitations

- 7.5.3.1 The data summarised in **Table 7.6** are generally considered appropriate for the purposes of providing a suitable baseline assessment in **Section 7.6**, with the following limitations taken into account.
- 7.5.3.2 No site survey has been undertaken for PEIR and so the baseline presented here is based upon a desk top study. Site visit/s will be undertaken for specific areas of interest during ES chapter in future.
- 7.5.4 A request was made to all local authorities in the Study Area for information they hold relating to unlicensed private water supplies (PWS). CWAC and Salford noted that they do not hold data relating to private water supply (PWS). CEC supplied a list of PWS and locations, but all PWS were found to be outside of the Study Area. Trafford and Warrington did not provide PWS information. Halton, Knowsley and St Helens Councils did not respond to the data request.

<sup>81</sup> British Geological Survey (2022). BGS Geology 50K (online). Available at: <https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/> (Accessed 2 March 2022)

<sup>82</sup> British Geological Survey (2022). BGS Geology 10K (online). Available at: <https://www.bgs.ac.uk/datasets/bgs-geology-10k/> (Accessed 2 March 2022)

<sup>83</sup> Defra (2021) MAGIC. (online). Available at: <http://www.magic.gov.uk/MagicMap.aspx> (Accessed 15 November 2021).

<sup>84</sup> Cranfield Soil and AgriFood Institute (2021). Soilscales map, (online). Available at: <http://www.landis.org.uk/soilscales/> (Accessed 15 November 2021).

## 7.6 Baseline

7.6.1.1

The description of the baseline conditions in this section is based on the Study Area and Zol defined within **Section 7.4** (see **Figure 7.1**). Where appropriate, further detailed description is provided on the basis of the pipeline corridors defined in the **Chapter 2: The Project** as follows (**Figure 7.1**):

- West Corridor: Stanlow Hydrogen Production Plant (HPP) to Central Hub HAGI (two options (WP1 and WP2) are currently under consideration), incorporating Rocksavage HAGI (three options (RSH1 to RSH3) currently under consideration), with numerous spurs into Intergeren, Rocksavage via the Runcorn HAGI. There are also two further pipeline options southeast of the Rocksavage HAGI (WP3 and WP4).
- North Corridor: Central Hub HAGI to St Helens HAGI, incorporating HAGIs at Clock Face and Higher Walton, with numerous spurs into Warrington and Ingevity and St Helens. Within this corridor there are two options under consideration for the area used by the Creamfields Festival Site (NP1 to NP3) and a single option (HWH1) at Higher Walton following the trenchless crossing of the A56 (NP4 and NP5).
- East Corridor: Central Hub HAGI to Partington HAGI, incorporating a HAGI at Warburton and Block Valve near Sworton Heath (three options (EBV1 to EBV3) currently under consideration) and spurs into Partington.
- South Corridor: Central Hub HAGI to Hydrogen Storage Facility at salt caverns located north of Middlewich (four routing options (SP1 to SP4) currently under consideration), incorporating a Block Valve (five options (SBV1 to SBV5) currently under consideration) and spur into Winnington.

### Current baseline

#### Climate

7.6.1.2

The Met. Office website holds the latest set of 30-year rainfall averages, covering the period 1991-2021. The two climate stations closest to the Study Area are the Hawarden Airport climate station<sup>85</sup> 13km west of the Study Area and the Woodford climate station<sup>86</sup> 12km east of the Study Area. The key variables from 1991-2020 for these stations are listed in **Table 7.7**.

<sup>85</sup> Hawarden (Flintshire) UK climate averages - Met Office 16/05/2022

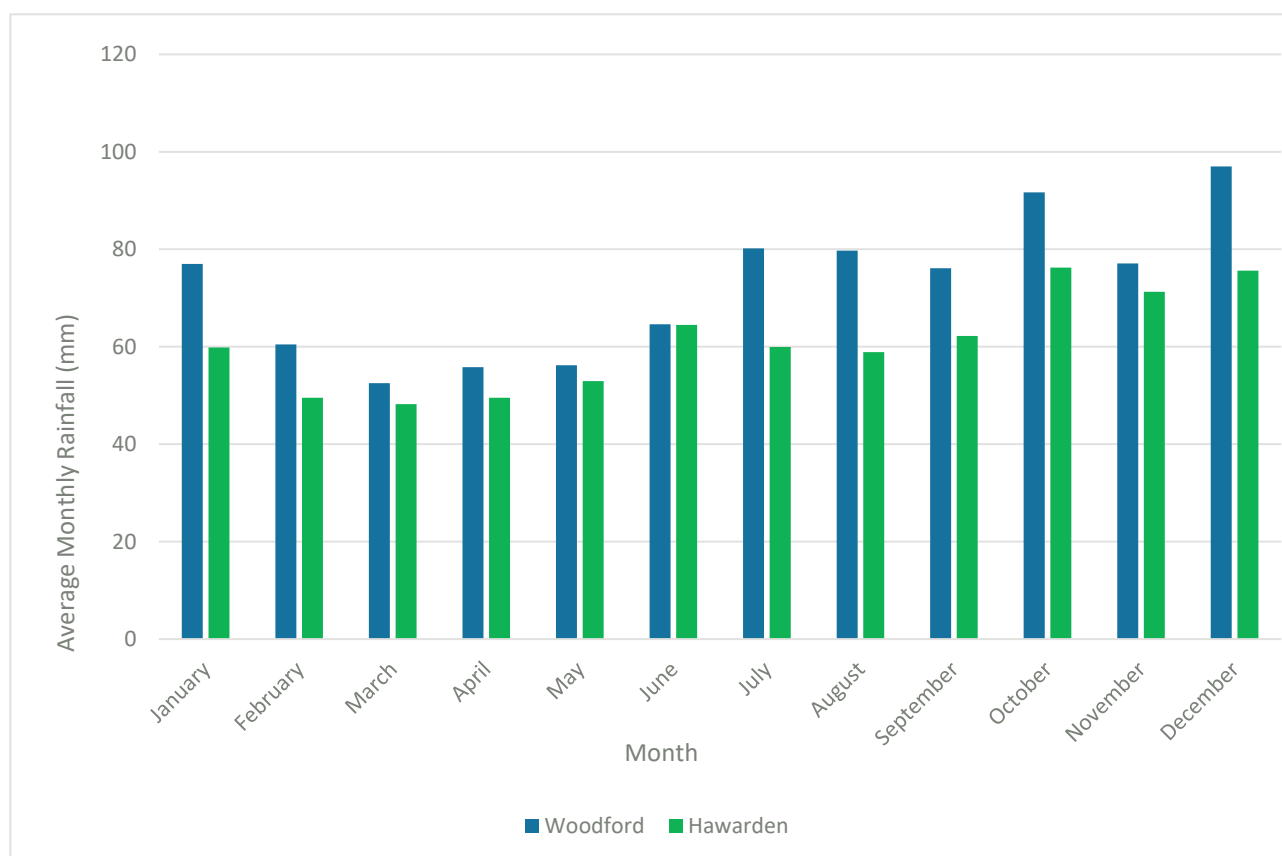
<sup>86</sup> Woodford (Greater Manchester) UK climate averages - Met Office 16/05/2022

**Table 7.7 Annual climate information for Hawarden Airport and Woodford climate stations**

| Climate Station         | Location (NGR) | Distance from Study Area (km) | Altitude (mAOD) | Annual Mean Rainfall (mm) | Annual Days of Rainfall $\geq$ 1mm | Annual Mean Max Temperature ( $^{\circ}$ C) | Annual Mean Minimum Temperature ( $^{\circ}$ C) | Annual Mean Wind Speed (knots) |
|-------------------------|----------------|-------------------------------|-----------------|---------------------------|------------------------------------|---------------------------------------------|-------------------------------------------------|--------------------------------|
| <b>Hawarden Airport</b> | SJ 34192 64553 | 13                            | 10              | 729                       | 137                                | 14.3                                        | 6.4                                             | 7.1                            |
| <b>Woodford</b>         | SJ 89843 82578 | 12                            | 88              | 868                       | 156                                | 13.6                                        | 5.9                                             | 7.6                            |

- 7.6.2 **Table 7.7** suggests that the Woodford climate station, located east of the Study Area, has higher average annual rainfall than the Hawarden Airport climate station, located west of the Study Area. This is likely to be due to increased elevations in the east, as the topography rises towards the Pennines.
- 7.6.3 Rainfall data from the National River Flow Archive based on Met Office Standard Average Rainfall data<sup>87</sup> also shows that the upland areas to the north and east of the Study Area and Greater Manchester have greater average annual rainfalls (1,400-3,000mm) than the central, western and lowland areas of the Study Area (650-850mm).
- 7.6.4 The following graphic displays the average monthly rainfall recorded at Hawarden Airport climate station and Woodford climate station.

**Graphic 7.1 Average monthly rainfall that has been recorded at each of the Environment Agency stations during the 1991-2020 period**



- 7.6.5 The graphic above indicates that the periods of highest rainfall in a typical year are expected between October and January, with the lowest between February and May.

<sup>87</sup> UK Centre for Ecology & Hydrology (2022). Home Page. (online) Available at: <https://nrfa.ceh.ac.uk/> (Accessed 16 May 2022).

## Topography

- 7.6.6 OS 1:25,000<sup>88</sup> mapping indicates that the Study Area covers a range of elevations. The lowest elevations are present in the west of the Study Area along the West Corridor at Frodsham Marsh, at around 5mAOD. The areas within the Study Area adjacent to the Manchester Ship Canal and Weaver Navigation are around 5mAOD to 10mAOD. However, elevations rise steeply up from these lows to areas within Runcorn up to 70mAOD on Runcorn Hill, and the South Corridor which continues south-east towards Northwich and rises to 50mAOD in parts. The parts of the Study Area to the west of Northwich, between Winnington and Barnton, levels drop to around 12mAOD in the centre of the town in areas surrounding the watercourses but for the areas of the Study Area which surround Northwich levels rise up to between 40mAOD and 50mAOD.
- 7.6.7 Within Warrington, the Study Area is mostly adjacent to the Manchester Ship Canal and therefore also at low elevations of around 5mAOD to 10mAOD. The North Corridor to the west of Warrington, which heads north to St Helens rises from lows of 10mAOD adjacent to the Manchester Ship Canal up to highs of 70mAOD in St Helens. The Partington Gas Works is set at 15mAOD to 20mAOD with the northern extent of the North Corridor remaining at similar elevations as it continues south before rising to 50mAOD south of the Bridgewater Canal, continuing to rise to a high point of 70mAOD adjacent to High Legh before falling as it continues to the south-west down to 40mAOD in Partington.

## Watercourses

- 7.6.8 The Preliminary Order Limits extends over three WFD Management Catchments; the Upper Mersey, the Lower Mersey and the Weaver Gowdy (**Figure 7.1**) and covers 22 WFD River water body catchments (**Figure 7.2**), multiple main rivers, ordinary watercourses, and canals. The WFD water body catchments defining the Study Area are summarised in **Table 7.8**. The majority are river water bodies, but there is also a transitional water body (the Lower Mersey) and a number of canal water bodies. The key main rivers within the Preliminary Order Limits are the Rivers Weaver, Dane, Bollin and Mersey, and the Manchester Ship Canal, sections of which are classified as a main river.

### *Mersey Lower Management Catchment*

- 7.6.9 Within the Mersey Lower Management Catchment, the two main 'operational catchments' that are intersected by the Preliminary Order Limits are the Sankey and Glaze. Within the Sankey Operational Catchment, the main watercourse is Sankey Brook, into which most of the operational catchment's watercourses flow before discharging into the Mersey. Within the Glaze Operational Catchment, the watercourses generally flow south towards Warrington and discharge into the Manchester Ship Canal or the Upper Mersey.

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<sup>88</sup> Microsoft (2021). Bing maps. Images courtesy of OS. Available at: <https://www.bing.com/maps> (Accessed: 20 June 2021).

### *Mersey Upper Management Catchment*

- 7.6.10 The watercourses within the Bollin Dean Mersey Upper Operational Catchment generally flow west or northwest into the Upper Mersey and Manchester Ship Canal, mainly via the Dean, Bollin or Sinderland Brook.

### *Weaver Gowy Management Catchment*

- 7.6.11 Within the Weaver Gowy Management Catchment there are four operational catchments; Dane; Gowy; Weaver Lower; and Weaver Upper. The Weaver Lower Operational Catchment is the most prominent operational catchment within the Preliminary Order Limits, with much of these south of the Mersey located within its boundary. Throughout the operational catchment the watercourses generally flow north-westerly towards the Mersey and the Manchester Ship Canal, except for the watercourses in the northeast of the catchment, these initially flow south towards Northwich before turning to flow north-westwards. The Preliminary Order Limits are also intersected by the Gowy Operational Catchment at the western end of the Western Corridor; within this operational catchment the watercourses generally flow northwards into the River Gowy and discharge into the Mersey. Sections of the Southern Corridor are within the Weaver Upper Operational Catchment; within this operational catchment the watercourses generally flow north and into the River Weaver towards Northwich. The Southern Corridor is also within the Dane Operational Catchment, in which the watercourses generally flow northeast into Northwich.

### *WFD Water Bodies*

- 7.6.12 **Table 7.8** describes the WFD Water bodies that are intersected by the Study Area with details from the EA WFD Water body Catchment Explorer<sup>89</sup>.

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<sup>89</sup> Environment Agency (2022). WFD Catchment Explorer (online). Available at: <https://environment.data.gov.uk/catchment-planning> (Accessed 24 May 2022).

Table 7.8 WFD Water Bodies

| Name                                                              | Reference ID   | Type                                                  | Upstream Water Body                                               | Downstream Water Body     | Crosses pOL* at                                                                                                                                   | Length (km) | Catchment Area (km²) | Comment                                                                                                                                                                                                                         |
|-------------------------------------------------------------------|----------------|-------------------------------------------------------|-------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Major Study Area WFD Water Bodies                                 |                |                                                       |                                                                   |                           |                                                                                                                                                   |             |                      |                                                                                                                                                                                                                                 |
| Manchester Ship Canal                                             | GB71210004     | Canal Artificial                                      | N/A                                                               | N/A                       | Northern Corridor<br>SJ 56829 84929<br>SJ 57528 85223<br>SJ 58738 85603                                                                           | 38.688      | N/A                  | N/A                                                                                                                                                                                                                             |
| River Mersey                                                      | GB531206908100 | Transitional Water (heavily modified)                 | Mersey (Bollin confluence to Howley Weir) including Padgate Brook | N/A                       | Northern Corridor<br>SJ 60264 86584<br>SJ 59764 86629<br>SJ 59582 87414<br>SJ 56010 86191                                                         | N/A         | N/A                  | N/A                                                                                                                                                                                                                             |
| Mersey (Bollin confluence to Howley Weir) including Padgate Brook | GB112069061012 | River (heavily modified)                              | Bollin (Ashley Mill to Manchester Ship Canal)                     | Mersey                    | N/A                                                                                                                                               | 16.826      | 19.601               | N/A                                                                                                                                                                                                                             |
| Sankey Canal                                                      | GB71210055     | Canal - Artificial                                    | N/A                                                               | N/A                       | Northern Corridor<br>SJ 55697 86214<br>SJ 54671 85783                                                                                             | 12.954      | N/A                  | Also known as the St. Helens Canal. Officially closed in 1963 but still contains water and is currently going through a restoration project to make the water body navigable. The Canal is truncated and shown as two sections. |
| Bridgewater Canal                                                 | GB71210001     | Canal – Artificial                                    | N/A                                                               | N/A                       | Northern Corridor<br>SJ 58370 84702<br>SJ 59042 84785<br>SJ 59160 84793<br>SJ 57599 83574<br>Eastern Corridor<br>SJ 71900 86600<br>SJ 71614 86669 | 60.978      | N/A                  | The Canal splits into two limbs northeast of Stretford. The eastern limb goes to central Manchester and the western limb goes to Leigh before connecting to the Leeds and Liverpool Canal Leigh Branch.                         |
| River Weaver (Marbury Brook to Dane)                              | GB112068060460 | River (not designated artificial or heavily modified) | Weaver (Marbury Brook to Barnett Brook)                           | Weaver (Dane to Frodsham) | Southern Corridor<br>SJ 65458 68189<br>SJ 64628 69527<br>SJ 64061 70182<br>SJ 64250 70655                                                         | 63.594      | 126.627              | N/A                                                                                                                                                                                                                             |

| Name                                                          | Reference ID   | Type                                                  | Upstream Water Body                                    | Downstream Water Body                           | Crosses pOL* at                                                                             | Length (km) | Catchment Area (km²) | Comment |
|---------------------------------------------------------------|----------------|-------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------|-------------|----------------------|---------|
| River Weaver (Dane to Frodsham)                               | GB112068060500 | River (Heavily Modified)                              | River Weaver (Marbury Brook to Dane)                   | Mersey                                          | Southern Corridor<br>SJ 65099 74953<br>SJ 59820 76191                                       | 29.847      | 61.276               | N/A     |
| Trent and Mersey Canal (summit to Preston Brook Tunnel Water) | GB71210247     | Canal Artificial                                      | N/A                                                    | N/A                                             | Western Corridor<br>SJ 68051 69361<br>Southern Corridor<br>SJ 64912 75644<br>SJ 60067 76569 | 49.23       | N/A                  | N/A     |
| West Corridor WFD Waterbodies                                 |                |                                                       |                                                        |                                                 |                                                                                             |             |                      |         |
| Peckmill Brook                                                | GB112068060330 | River (Not designated artificial or heavily modified) | N/A                                                    | Mersey                                          | SJ 47803 75707                                                                              | 7.712       | 26.42                | N/A     |
| Gowy (Milton Brook to Mersey)                                 | GB112068060250 | River, heavily modified                               | Gowy and Tribs (Source to Milton Brook) & Ashton Brook | Mersey                                          | N/A                                                                                         | 10.449      | 16.251               | N/A     |
| North Corridor WFD Water Bodies                               |                |                                                       |                                                        |                                                 |                                                                                             |             |                      |         |
| Sutton Brook                                                  | GB112069061170 | River (heavily modified)                              | N/A                                                    | Sankey Brook (Hardshaw Brook to Rainford Brook) | SJ 50114 91285<br>SJ 50434 91216<br>SJ 50622 91076                                          | 10.566      | 18.791               | N/A     |
| Sankey Brook (Hardshaw Brook to Rainford Brook)               | GB112069061180 | River (heavily modified)                              | Sutton Brook                                           | Sankey Brook (Rainford Brook to Mersey)         | N/A                                                                                         | 1.187       | 0.527                | N/A     |
| Whittle Brook (Mersey Estuary)                                | GB112069060990 | River (heavily modified)                              | N/A                                                    | Mersey                                          | N/A                                                                                         | 9.769       | 14.594               | N/A     |
| Hardshaw (Windle) Brook                                       | GB112069061210 | River (heavily modified)                              | N/A                                                    | Sankey Brook (Hardshaw Brook to Rainford Brook) | N/A                                                                                         | 3.659       | 25.086               | N/A     |
| Keckwick Brook                                                | GB112068060520 | River (heavily modified)                              | N/A                                                    | Mersey                                          | N/A                                                                                         | 5.748       | 24.629               | N/A     |

| Name                                                                   | Reference ID   | Type                                                  | Upstream Water Body                                                             | Downstream Water Body                                                             | Crosses pOL* at | Length (km) | Catchment Area (km²) | Comment |
|------------------------------------------------------------------------|----------------|-------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------|-------------|----------------------|---------|
| Dog Clog Brook (including Mill Brook)                                  | GB112069060690 | River (heavily modified)                              | N/A                                                                             | Ditton Brook (Halewood to Mersey Estuary)                                         | N/A             | 6.756       | 8.719                | N/A     |
| Prescot Brook (Logwood Mill Brook)                                     | GB112069060710 | River (not designated artificial or heavily modified) | N/A                                                                             | Dog Clog Brook (including Mill Brook)                                             | N/A             | 7.017       | 17.449               | N/A     |
| East Corridor WFD Water Bodies                                         |                |                                                       |                                                                                 |                                                                                   |                 |             |                      |         |
| Glaze Brook                                                            | GB112069061420 | River (not designated artificial or heavily modified) | Pennington Brook (Glaze) & Bedford Brook                                        | Mersey/ Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin)            | N/A             | 16.749      | 39.357               | N/A     |
| Mersey/ Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin) | GB112069061011 | River (heavily modified)                              | Irwell / Manchester Ship Canal (lrk to confluence with Upper Mersey) Water Body | Manchester Ship Canal                                                             | N/A             | 6.524       | 15.39                | N/A     |
| Mersey (upstream of Manchester Ship Canal)                             | GB112069061030 | River (heavily modified)                              | Tame (Swineshaw Brook to Mersey)                                                | Mersey/ Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin)            | N/A             | 34.992      | 54.524               | N/A     |
| Sinderland Brook                                                       | GB112069060980 | River (not designated artificial or heavily modified) | Sinderland Brook (Fairywell Brook and Baguley Brook)                            | Mersey/ Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin) Water Body | SJ 73084 90515  | 8.319       | 15.956               | N/A     |
| Sinderland Brook (Fairywell Brook and Baguley Brook)                   | GB112069061270 | River (heavily modified)                              | N/A                                                                             | Sinderland Brook                                                                  | N/A             | 15.552      | 25.767               | N/A     |
| Timperley Brook                                                        | GB112069061260 | River (heavily modified)                              | N/A                                                                             | Sinderland Brook                                                                  | N/A             | 6.521       | 14.96                |         |

| Name                                                               | Reference ID   | Type                                                  | Upstream Water Body                                   | Downstream Water Body                                             | Crosses pOL* at | Length (km) | Catchment Area (km²) | Comment |
|--------------------------------------------------------------------|----------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------|-----------------|-------------|----------------------|---------|
| Bollin (River Dean to Ashley Mill)                                 | GB112069061381 | River (heavily modified)                              | Dean (Bollington to Bollin) & Bollin (Source to Dean) | Bollin (Ashley Mill to Manchester Ship Canal                      | N/A             | 14.8        | 17.671               | N/A     |
| Bollin (Ashley Mill to Manchester Ship Canal)                      | GB112069061382 | River (heavily modified)                              | Bollin (River Dean to Ashley Mill)                    | Mersey (Bollin confluence to Howley Weir) including Padgate Brook | SJ 71876 87842  | 20.971      | 29.254               | N/A     |
| Arley Brook (source to Gale Brook)                                 | GB112068060420 | River (Not designated artificial or heavily modified) | N/A                                                   | Smoker Brook (Gale Brook to Wincham Brook)                        | SJ 65362 81317  | 9.972       | 20.164               | N/A     |
| Cogshall Brook                                                     | GB112068060510 | River (Not designated artificial or heavily modified) | N/A                                                   | Wade Brook                                                        | SJ 60745 78426  | 5.404       | 27.64                | N/A     |
| Gale Brook                                                         | GB112068060430 | River (Not designated artificial or heavily modified) | N/A                                                   | Smoker Brook (Gale Brook to Wincham Brook)                        | N/A             | 3.984       | 13.482               | N/A     |
| Birkin Brook – (Mobberley Brook to River Bollin including Rosther) | GB112069061370 | River (Not designated artificial or heavily modified) | Mobberley Brook & Sugar Brook                         | Bollin (Ashley Mill to Manchester Ship Canal)                     | N/A             | 10.895      | 18.576               | N/A     |
| South Corridor WFD Water Bodies                                    |                |                                                       |                                                       |                                                                   |                 |             |                      |         |
| Bogart Brook                                                       | GB112068060540 | River (Not designated artificial or heavily modified) | N/A                                                   | Weaver (Marbury Brook to Dane)                                    | SJ 67732 69311  | 2.032       | 12.434               | N/A     |
| River Dane (Wheelock to Weaver)                                    | GB112068060470 | River (Not designated artificial or heavily modified) | Dane (Cow Brook to Wheelock)                          | Weaver (Dane to Frodsham)                                         | SJ 67732 69311  | 15.102      | 12.85                | N/A     |

| Name                                                     | Reference ID   | Type                                                  | Upstream Water Body                        | Downstream Water Body           | Crosses pOL* at | Length (km) | Catchment Area (km²) | Comment                                 |
|----------------------------------------------------------|----------------|-------------------------------------------------------|--------------------------------------------|---------------------------------|-----------------|-------------|----------------------|-----------------------------------------|
| Puddinglake Brook                                        | GB112068060220 | River (Not designated artificial or heavily modified) | N/A                                        | River Dane (Wheelock to Weaver) | SJ 68908 69698  | 6.508       | 13.382               | N/A                                     |
| Wade Brook                                               | GB112068060370 | River (Not designated artificial or heavily modified) | N/A                                        | Weaver (Dane to Frodsham)       | N/A             | 27.545      | 52.804               | N/A                                     |
| Peover Eye                                               | GB112068060390 | River (Not designated artificial or heavily modified) | Snape Brook, Bag Brook & Smoker Brook      | Wade Brook                      | N/A             | 30.202      | 49.88                | N/A                                     |
| Cuddington Brook (Source to Crowton Brook)               | GB112068060480 | River (Not designated artificial or heavily modified) | N/A                                        | Crowton Brook                   | N/A             | 5.325       | 24.502               | N/A                                     |
| Crowton Brook                                            | GB112068060550 | River (Not designated artificial or heavily modified) | Cuddington Brook (Source to Crowton Brook) | Weaver (Dane to Frodsham)       | N/A             | 4.692       | 27.594               | N/A                                     |
| Forge (Kidd) Brook                                       | GB112068060400 | River (Not designated artificial or heavily modified) | N/A                                        | Wade Brook                      | N/A             | 5.769       | 11.799               | Watercourse flows through Budworth Mere |
| Shropshire Union Canal, Market Drayton to Ellesmere Port | GB71210133     | Canal Artificial                                      | N/A                                        | N/A                             | N/A             | N/A         | N/A                  | N/A                                     |
| Ash Brook (Darley Brook to Weaver)                       | GB112068055451 | River (Not designated artificial or heavily modified) | Darley Brook                               | Weaver (Marbury Brook to Dane)  | N/A             | 7.854       | 9.366                | N/A                                     |

| Name                                                | Reference ID   | Type                                                  | Upstream Water Body                                          | Downstream Water Body          | Crosses pOL* at | Length (km) | Catchment Area (km²) | Comment |
|-----------------------------------------------------|----------------|-------------------------------------------------------|--------------------------------------------------------------|--------------------------------|-----------------|-------------|----------------------|---------|
| Valley Brook (Englesea Brook to Weaver)             | GB112068055310 | River, heavily modified                               | Valley Brook (Source to Englesea Brook)                      | Weaver (Marbury Brook to Dane) | N/A             | 8.162       | 8.294                | N/A     |
| Rookery Brook, Burland and Brindley Brook to Weaver | GB112068055340 | River (Not designated artificial or heavily modified) | Rookery Brook, Source to Burland and Brindley Bk. Water Body | Weaver (Marbury Brook to Dane) | N/A             | 7.835       | 18.299               | N/A     |
| Dane (Cow Brook to Wheelock)                        | GB112068060190 | River (Not designated artificial or heavily modified) | Dane (Clough Brook to Cow Brook)                             | Dane (Wheelock to Weaver)      | N/A             | 40.132      | 44.758               | N/A     |

Note: \* Preliminary Order Limit

7.6.13 **Table 7.9** describes the WFD Lake Water bodies that are within the Study Area.

**Table 7.9 WFD Lake Water Bodies**

| Name               | Reference ID | Type | Area (ha) | Location (NGR) | Comment         |
|--------------------|--------------|------|-----------|----------------|-----------------|
| Petty Pool         | GB31233344   | Lake | 11.32     | SJ 61865 70080 | Designated SSSI |
| Appleton Reservoir | GB31232665   | Lake | 7.35      | SJ 60133 84265 | N/A             |
| Oakmere            | GB31233474   | Lake | 18.35     | SJ 57453 67761 | Designated SSSI |

*River flow Gauges*

- 7.6.14 There are a number of river flow gauges for the watercourses that intersect the Study Area, as summarised in **Table 7.10**. There are river gauges located on the River Dane, Wincham Brook, Arley Brook, Sankey Brook, the River Bollin, Sinderland Brook, the River Mersey and the River Weaver.

Table 7.10 Flows for Gauges within the Study Area taken from the National River Flow Archive

| Gauge Number | Gauge Name            | Watercourse      | NGR      | Catchment Area (km <sup>2</sup> ) | Mean Flow (m <sup>3</sup> /s) | Q95 (m <sup>3</sup> /s) | Record start and end date |
|--------------|-----------------------|------------------|----------|-----------------------------------|-------------------------------|-------------------------|---------------------------|
| 68003        | Rudheath              | River Dane       | SJ667718 | 407.1                             | 5.182                         | 0.991                   | 1949-2020                 |
| 68007        | Lostock Gralam        | Wincham Brook    | SJ697757 | 148.0                             | 1.926                         | 0.384                   | 1962-2014                 |
| 68011        | Gore Farm             | Arley Brook      | SJ696799 | 36.5                              | 0.455                         | 0.017                   | 1975-1982                 |
| 69030        | Causey Bridges        | Sankey Brook     | SJ587922 | 154.0                             | 2.576                         | 0.721                   | 1977-2020                 |
| 69006        | Dunham Massey         | River Bollin     | SJ726875 | 257.6                             | 4.330                         | 1.178                   | 1955-2002                 |
| 69045        | Bollington Mill Total | River Bollin     | SJ730870 | 256.7                             | 4.101                         | 1.280                   | 2009-2020                 |
| 69013        | Partington            | Sinderland Brook | SJ725904 | 44.8                              | 0.519                         | 0.17                    | 1976-2020                 |
| 69037        | Westy                 | River Mersey     | SJ628883 | 2030                              | 36.772                        | 9.082                   | 1986-2020                 |
| 68001        | Ashbrook              | Weaver           | SJ671635 | 622                               | 5.668                         | 1.246                   | 1937-2020                 |

Note: Date from is from the Centre for Ecology and Hydrology, (2021). National River Flow Archive. (online). Available at: <https://nrfa.ceh.ac.uk/> (Accessed 5 May 2022).

## Geology

- 7.6.15 The following sections provide a summary of the bedrock and superficial deposits which the Study Area overlies and are supported by **Figures 7.3** (bedrock geology) and **7.4** (superficial geology). BGS mapping (1:625,000), (1:50,000) and (1:10,000) has been used to support this assessment.
- 7.6.16 The bedrock geology underlying much of the central part of the Study Area is rock of Triassic age consisting of Bollin Mudstone Member. Wilmslow, Helsby, and Kinnerton Sandstone formations are also common throughout the Study Area. Much of the Study Area is overlain by superficial deposits of Till – Diamicton. The mapping also indicates large areas of alluvium (clay, silt sand and gravel), blown sand (known as the Shirdley Hill Sand Formation), and river terrace deposits (glaciofluvial deposits of Devensian sand and gravel) surrounding the River Mersey and its tributaries, including the flow path of the River Weaver and the River Bollin. Superficial deposits of glacial sand and gravel (glaciofluvial deposits) are also present in scattered clusters throughout the central area of the Study Area. Peat occurs within the northeast of the Study Area and at multiple other locations, including the West and East Corridors, and is sometimes interbedded with other superficial deposits in some areas.

### West Corridor

- 7.6.17 The underlying geology of the West Corridor is predominantly Triassic rock, consisting of the Bollin Mudstone Member, Tarporley Siltstone, Helsby Sandstone, Wilmslow Sandstone, Chester Sandstone and the Kinnerton Sandstone Formations. The Bollin Mudstone Member underlies the preliminary Order Limits in the eastern area of the West Corridor. The Runcorn/Rocksavage Spur is underlain by the Bollin Mudstone Member. Around Frodsham, several faults are present located near the confluence of the River Weaver and the Manchester Ship Canal trending generally north-south along which areas of Tarporley Siltstone, Wilmslow Sandstone and Helsby Sandstone Formations have been displaced. Further to the southwest at Helsby, a fault intersects Wilmslow Sandstone and Chester Pebble Beds Formations. Permian age rock, consisting of the Kinnerton Sandstone Formation is located further west, separated from an area of Chester Pebble Beds Formation underlying the westernmost area of the West Corridor.
- 7.6.18 The superficial geology of the West Corridor is made up of areas of alluvium consisting of clay, silt, sand and gravel associated with the River Weaver, and Devensian glaciofluvial deposits consisting of sand and gravel, and Devensian Till Diamicton. The Runcorn/Rocksavage Spur and areas to the east of the Preliminary Order Limits in this area have little superficial geology, commonly being absent between areas of Devensian Till Diamicton. Towards the coast, to the west of Frodsham the superficial geology is predominantly a mix of alluvium, river terrace deposits and Devensian Till Diamicton in the westernmost area of the Preliminary Order Limits. These deposits may be interbedded with peat in this area, but the extent to which these are present within the upper strata is to be confirmed during GI works.

### *North Corridor*

- 7.6.19 The predominant bedrock of the North Corridor south of the River Mersey crossing is Triassic rock consists of the Bollin Mudstone of the Mercia Mudstone Group as well as the Tarporley Siltstone, Helsby Sandstone and Wilmslow Sandstone. Three layers of the Mercia Mudstone Group are also present within the northern part of the central Bollin Mudstone area. Several faults are present across the North Corridor, with a predominantly north-south orientation. The 1:10,000 mapping shows several faults are present within the Preliminary Order Limits directly south of the River Mersey crossing intersecting the Wilmslow Sandstone, Helsby Sandstone, Tarporley Sandstone and Bollin Mudstone groups. The bedrock geology of the Warrington Spur is Wilmslow Sandstone and Helsby Sandstone. Triassic rocks are also present directly to the north of the River Mersey crossing consisting of Wilmslow Sandstone and Chester Pebble Beds Sandstone Formation.
- 7.6.20 North of the Chester Pebble Beds Sandstone Formation bedrock the geology comprises mainly Permian rocks, consisting of the Kinnerton Sandstone formation, and the Warwickshire Group, consisting of the Etruria Formation made up of mudstone, sandstone and conglomerate. There are multiple faults crossing the Preliminary Order Limits in this area, with one main fault oriented east-west and several associated faults approximately perpendicular, oriented north-south. Further north along the Preliminary Order Limits, towards Thatto Heath and St Helens, the bedrock changes to the Pennine Middle Coal Measures formation, consisting of mudstone, siltstone and sandstone.
- 7.6.21 Superficial deposits are widespread within the North Corridor consisting predominantly of Devensian Till Diamicton in the area south of the River Mersey crossing, with areas of the alluvium, blown sand (Shirdley Hill Sand Formation) and river terrace deposits present associated with the River Mersey. The Warrington Spur is parallel to the trend of the River Mersey and associated with similar superficial deposits. These areas may also include layers of peat. North of the River Mersey superficial deposits are predominantly Devensian Till Diamicton.

### *East Corridor*

- 7.6.22 The bedrock of the East Corridor, west of Broomedge, is Triassic rock consisting of Bollin Mudstone. Bedrock geology transitions to Tarporley Siltstone Formation and the Helsby Sandstone Formation to the northeast of Broomedge along the line of north-west to south-east oriented faults that intersects the Preliminary Order Limits northeast of Broomedge. Bedrock geology further northeast consists of the Northwich Halite Member, Bollin Mudstone Member, Helsby Sandstone Formation, Wilmslow Sandstone Formation, and Tarporley Siltstone Formation consisting of siltstone, and siltstone and sandstone.
- 7.6.23 Superficial deposits overlying the East Corridor consists predominantly of Devensian Till Diamicton with alternating areas of Devensian glaciofluvial deposits consisting of sand and gravel. To the north and west of Arley, superficial deposits of peat, glacial sand and gravel are present and occasionally absent. North of Broomedge to Dunham Massey, the Shirdley Hill Sand Formation, Devensian glaciofluvial river terrace deposits, wind-blown sand and alluvium

consisting of clay, silt, sand and gravel are present associated with the River Bollin. In the northeast corner of the Study Area around Partington the superficial geology is predominantly Devensian glaciofluvial river terrace deposits with an area of peat, alluvium consisting of clay, silt, sand and gravel associated with the River Mersey.

### *South Corridor*

- 7.6.24 The bedrock geology of the South Corridor is Triassic rock consisting of Bollin Mudstone, Northwich Halite and Sidmouth Mudstone Members. The Byley Mudstone Formation and Wych Mudstone Formation (undifferentiated) also underlies the south-western most part of the Study Area. The bedrock geology of the Northwich Spur consists of Bollin Mudstone and Northwich Halite Members. The western area of the Northwich Spur is intersected by a fault oriented north northwest – south southeast.
- 7.6.25 Superficial geology of the South Corridor is primarily Devensian Till Diamicton with areas of alluvium consisting of sand, silt and gravel associated with the River Dane and River Weaver. In the northern area of the South Corridor superficial deposits are absent at Partington, and overlain by alluvium associated with the River Weaver. Southwest of Cuddington, areas of sand and gravel are predominant. At Moulton in the southeast of the Study Area the Preliminary Order Limits are overlain by Devensian Till Diamicton, and an area of of alluvium consisting of clay, silt, sand and gravel associated with the River Weaver.

### *Soils and Land Use*

- 7.6.26 Landis Soilscales<sup>84</sup> mapping indicates a number of soil types within the Study Area. The predominant soil type in the Study Area is slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage. The urban areas within the Study Area are predominantly residential, but also contain areas of industrial development and urban green space. Rural areas in the Study Area are predominantly arable farming with limited areas of farm buildings, small settlements and local roads along with minor wooded areas interspersed throughout.

### *West Corridor*

- 7.6.27 Soilscales mapping indicates a number of soil types within the West Corridor and Runcorn/Rocksavage Spur. Soils in the east of the West Corridor are a mixture of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage, loamy and clayey floodplain soils with naturally high groundwater associated with the River Weaver, and freely draining slightly acid sandy soils. Towards the coast to the west are areas of loamy and sandy soils with naturally high groundwater and a peaty surface.
- 7.6.28 Land in the West Corridor has a number of different uses. Arable farming makes up the vast majority of the land use outside of the urban areas. Interspersed between these there are limited areas of farm buildings and small settlements and local roads along with minor wooded areas. The urban areas along the West Corridor are Runcorn, Weston, Frodsham, Helsby and Elton. The West Corridor

also crosses the M56, in addition to multiple dual carriageways, smaller A, and B roads. Multiple railway lines are also present.

### *North Corridor*

- 7.6.29 Soils mapping indicates a number of soil types within the North Corridor. Soils in the south of the North Corridor are slowly permeable, seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage. Areas of freely draining slightly acid sandy soils are also present around Daresbury. The area directly south of the River Mersey crossing, around the Manchester Ship Canal has naturally wet very acid sandy and loamy soils with areas of loamy and clayey floodplain soils with naturally high groundwater and naturally wet drainage. Directly north of the River Mersey crossing the predominant soil type is slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage.
- 7.6.30 Land in the North Corridor has a number of different uses. Arable farming makes up the vast majority of the land use outside of the urban areas. Interspersed between these there are limited areas of farm buildings and small settlements and local roads along with minor wooded areas. The urban areas along the North Corridor are Daresbury, Walton, Warrington, Bold Heath, Sutton Manor, and St Helens. The North Corridor also crosses both the M56 and M62, in addition to multiple dual carriageways, smaller A, and B roads. There is also an oil refinery directly adjacent to the Preliminary Order Limits at Cuerdley Cross and multiple industrial estates associated with both the Manchester Ship Canal and the urban centres along the North Corridor. Multiple railway lines are also present.

### *East Corridor*

- 7.6.31 Soils mapping indicates a number of soil types within the East Corridor. Soils in the Preliminary Order Limits southwest of Broomedge are predominantly slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage. Two areas of naturally wet Fen Peat soils are present to the northeast and northwest of Arley. Soils to the northeast of Broomedge are more varied, consisting of naturally wet very acid sandy and loamy soils, loamy and clayey floodplain soils with naturally high groundwater associated with the River Bollin, and freely draining very acid sandy and loamy soils, and raised bog peat soils towards Partington.
- 7.6.32 Land in the East Corridor has a number of different uses. Arable farming makes up the vast majority of the land use outside of the urban areas. Interspersed between these there are limited areas of farm buildings and small settlements and local roads along with minor wooded areas. Partington is the only major urban area along the East Corridor. The East Corridor also crosses both the M56 and M6, in addition to multiple dual carriageways, smaller A, and B roads. Railway lines are also present.

### *South Corridor*

- 7.6.33 Soils mapping indicates a number of soil types within the South Corridor and Northwich Spur. Soils in the Study Area around the Northwich Spur are

predominantly slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage. The northern area of the South Corridor has both freely draining slightly acid sandy soils, and loamy and clayey floodplain soils with naturally high groundwater associated with the River Weaver. To the south of Northwich, soils are a mixture of both slowly permeable, seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage, and freely draining slightly acid sandy soils.

- 7.6.34 Land in the South Corridor has a number of different uses. Arable farming makes up the vast majority of the land use outside of the urban areas. Interspersed between these areas there are limited areas of farm buildings and small settlements and local roads along with minor wooded areas. The urban areas along the South Corridor are Weaverham, Northwich, Hartford and Moulton. The South Corridor has A and B roads associated with major urban areas. Railway lines are also present.

### *Aquifer status and vulnerability*

#### *Aquifer Status*

- 7.6.35 The Defra MAGIC Aquifer Designation Map was used to identify aquifer designations with the Study Area. Aquifer designation is varied across the Study Area with much of the northern and western part of the Study Area bedrock designated as a Principal Aquifer<sup>90</sup> associated with Permo-Triassic rocks (the Sherwood Sandstone Group) of the Wilmslow, Kinnerton and Chester Sandstone Formations. To the east of Frodsham the Study Area is predominantly Secondary B Aquifer<sup>91</sup>, associated with the Mercia Mudstone Formation. Where superficial aquifers are present in the Study Area these are predominantly secondary (undifferentiated)<sup>92</sup> other than areas of Secondary A Aquifer<sup>93</sup> around Northwich, Partington, Warrington and St Helens.

#### *North Corridor*

- 7.6.36 The bedrock geology underlying the southern section of the North Corridor is a Secondary B Aquifer where bedrock consists of Bollin Mudstone and Tarporley

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<sup>90</sup> These are layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

<sup>91</sup> These are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.

<sup>92</sup> These are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.

<sup>93</sup> Secondary A: Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Siltstone Members with medium to medium-low groundwater vulnerability<sup>94</sup>. The area of the North Corridor north of Walton is identified as a Principal Aquifer up to 600m thick and yielding up to 125l/s and is associated with Triassic rocks of the Wilmslow, Kinnerton and Chester Sandstone Formations.

- 7.6.37 An area of high groundwater vulnerability around the River Mersey is associated with superficial river terrace and sands and gravels. Areas of high vulnerability around the St Helens area are associated with areas with no superficial geology. Aquifer designation of the superficial geology where superficial geology is present south of the River Mersey is primarily Secondary (undifferentiated), with limited areas of Secondary A Aquifer<sup>95</sup>. North of the River Mersey the aquifer designation is Secondary (undifferentiated).

### *East Corridor*

- 7.6.38 The bedrock geology underlying the area southwest of Broomedge is defined as a Secondary B Aquifer associated with the Bollin Mudstone Member bedrock geology. In the area around Partington the bedrock is classified as a Principal Aquifer associated with the Triassic Wilmslow and Helsby Sandstone Formations.
- 7.6.39 Areas designated as superficial aquifers (undifferentiated) are associated predominantly with areas of till, with areas designated as superficial Secondary A aquifers associated with river terrace and alluvial deposits. Within the Preliminary Order Limits, in areas without superficial geology, at Frandley and High Legh, groundwater vulnerability is high. An area of medium vulnerability is also present around Partington. There is also a limited area within the Study Area northeast of Broomedge of soluble rock risk associated with the Northwich Halite Member.

### *South Corridor*

- 7.6.40 The bedrock geology underlying the South Corridor is defined as a Secondary B Aquifer, associated with the Bollin Mudstone and Sidmouth Mudstone Members, and Byley and Wych Mudstone Formations. Unproductive bedrock strata and soluble rock risk are present on the Northwich Spur, north of Northwich and at Moulton on the South Corridor, associated with the Northwich Halite Member.
- 7.6.41 Superficial aquifer designation in the South Corridor is a mixture of Secondary A and Secondary (undifferentiated). Secondary A Aquifer areas are associated with areas of alluvium and river terrace deposits consisting of sand and gravel. Secondary (undifferentiated) Aquifer areas are associated with Devensian till. Areas of high superficial groundwater vulnerability are present south of Hartford on the South Corridor, associated with Devensian till.

<sup>94</sup> The term vulnerability in this context means the overall likelihood of a pollutant reaching the groundwater. The EA vulnerability maps have five risk categories (High, Medium – High, Medium, Medium – Low, and Low) based on the type of aquifers present and the potential impact (i.e. on the aquifer designation).

<sup>95</sup> These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

*West Corridor*

- 7.6.42 The bedrock geology underlying the eastern section of the West Corridor bedrock is defined as a Secondary B Aquifer designation associated with the Bollin Mudstone and Tarporley Siltstone Groups. Further west, the Principal Aquifer bedrock designation is associated with the Triassic sandstones of the Kinnerton, Helsby, Chester Pebble Beds, and Wilmslow Formations.
- 7.6.43 Superficial aquifer designation is largely Secondary (undifferentiated) associated with areas of Devensian till and Tidal Flat Deposits. Areas of superficial deposits are a Secondary A aquifer and associated with alluvial deposits along the River Weaver. Areas of high groundwater vulnerability around the Runcorn and Halton area are associated with areas lacking superficial geology. Adjacent areas at Sutton Weaver and Aston also show areas where bedrock and superficial groundwater vulnerability is high.

*WFD Groundwater bodies*

- 7.6.44 There are five WFD groundwater bodies which intersect the Study Area, this includes the Wirral and West Cheshire Permo-Triassic Sandstone aquifer; the Weaver and Dane Quaternary Sand and Gravel aquifer; the Manchester and East Cheshire Permo-Triassic Sandstone Aquifer; the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone aquifers; and the Sankey and Glaze Carboniferous aquifer.

*Hydrogeology and hydraulic properties**Groundwater recharge, levels and flows*

- 7.6.45 The 1:625,000 scale Hydrogeological map of England and Wales and the Hydrogeological map of Clwyd and the Cheshire Basin indicates that groundwater levels are high in areas of recharge, e.g. along the Mid-Cheshire Ridge, and along the route of the River Weaver at levels reaching 100mAOD. Levels drop to the north and west indicating groundwater flow into the Mersey and River Dee respectively and are the principal discharge areas. The map shows groundwater levels as being typically around 0mAOD within the primary Permo-Triassic Sandstone aquifer at Ellesmere Port and within the Warrington area.
- 7.6.46 The EA data provided suggest that the Study Area is covered by a groundwater monitoring network of sixteen boreholes, predominantly located in the north and west, corresponding to the location of the Permo-Triassic Sandstone aquifer from which they measure groundwater levels. Regional 2017 groundwater contours provided by the EA in the Permo-Triassic Sandstone aquifer suggest the highest levels reaching greater than 50mAOD at St Helens; 40mAOD at Frodsham; and approximately 30mAOD to the south of the Mersey.
- 7.6.47 These groundwater levels are in line with those of recent data supplied by UU. Rest groundwater levels of 42, 22 and 29mbgl have been recorded at their boreholes at Daresbury (July 2018); Eccleston Hill (July 2020) and Walton Borehole 1 (July 2018) respectively. To the extreme west of the Study Area groundwater levels are close to the ground surface.

- 7.6.48 The main recharge area is the Mid-Cheshire Ridge, located south of Frodsham (West Corridor) and south and southwest of the Preliminary Order Limits (South Corridor), which is free of drift cover. In the rest of the catchment, recharge water has first to pass through drift, which is extensive in places, up to 60m thick, before it can penetrate to the Permo-Triassic Sandstone. For the unconfined aquifer recharge is estimated to be approximately 350mm/yr but where till cover is present recharge to the underlying aquifer will be considerably reduced to an estimated 52mm/yr<sup>96</sup>.
- 7.6.49 Where large displacements across faults have caused the juxtaposition of permeable and impermeable strata at depth, i.e. where Carboniferous strata are up-thrown against Permo-Triassic deposits and inliers of Carboniferous deposits to outcrop, the hydraulic continuity across the fault can be broken or significantly reduced. This arrangement may influence the groundwater levels within the area of faulting<sup>97</sup>.
- 7.6.50 The Mercia Mudstone Group, which overlies and confines the Permo-Triassic Sandstones over much of the Preliminary Order Limits area, particularly across the South and East Corridor, is also an aquitard. Mudstones occur throughout the Permo-Triassic rocks but mudstone bands tend to be less than 1m thick and are usually laterally discontinuous. Thick mudstones may form barriers to vertical flow locally, however because of their limited lateral extent they are unlikely to form regional barriers. However, perched water tables occur locally within the Triassic Sandstone and are often found above a mudstone layer.
- 7.6.51 Groundwater levels in a number of areas, e.g. Ellesmere Port, have been lowered as a result of abstraction, notably by industry, exceeding recharge during the past century. However, in more recent years a gradual recovery has been taking place because of reduced abstraction and improved aquifer management.
- 7.6.52 The upper surface of the Permo-Triassic Sandstone bedrock was deeply incised during the Quaternary glaciation, with thick accumulations of superficial deposits infilling a series of broadly north-trending buried channels between Ellesmere Port and Frodsham (West Corridor) and along the route of the Mersey (West Corridor).
- 7.6.53 In addition, alluvial deposits, river terrace deposits and peat are found along the major river valleys, whilst glacial sands and gravels provide locally important water supplies and permit direct and indirect (via hydraulic continuity with rivers) recharge except where they are till-covered. Groundwater levels within these deposits are likely to be variable, but close to the ground surface at lower elevations and where close to water bodies. Glacial Till Diamicton tends to limit

<sup>96</sup> BGS and Environment Agency - Baseline Report Series: 2. The Permo-Triassic Sandstones of west Cheshire and the Wirral Groundwater Systems and Water Quality Commissioned Report CR/02/109N.

<sup>97</sup> Allen, D J, Brewerton, L J, Coleby, L M, Gibbs, B R, Lewis, M A, MacDonald, A M, Wagstaff, S J, and Williams, A T. 1997. The physical properties of major aquifers in England and Wales. British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R&D Publication 8.

recharge and confines the underlying primary aquifer below. Groundwater levels within these deposits are likely to be shallow with little lateral flow.

- 7.6.54 The online BGS GeoIndex Viewer describes the Mercia Mudstone Group (South Corridor) as being of low permeability and generally having no groundwater except at shallow depths. The predominantly thick clayey sequence with subordinate sandstones may only occasionally support domestic water supplies. The Mercia Mudstone Group also retards infiltration and is further characterised by standing surface water features and higher rates of surface flow at times of heavy rainfall. Consequently, flow in the River Weaver can respond rapidly to rainfall.

### *Hydraulic properties*

- 7.6.55 **Table 7.11** provides an overview of the range of hydraulic properties for the Principal aquifer underlying the Preliminary Order Limits, based on typical values obtained from standard literature<sup>98</sup>. This summary indicates that transmissivity and storage exhibits the largest range within the Triassic Sandstone, due to the importance of fissure flow as a flow mechanism within this aquifer.
- 7.6.56 Natural controls on transmissivity within the Triassic Sandstone are many, including controls on the matrix hydraulic conductivity, such as variable lithology, layered heterogeneity and often results in an anisotropy within the strata. Lateral facies changes can also cause deposits to change from being aquifers to aquitards. Fine-grained layers within the Permo-Triassic sandstone have lower permeabilities and can act as confining layers.
- 7.6.57 Preferential flow paths exist within these strata between layers and predominantly through fracture hydraulic conductivity. Large-scale fracturing is commonly associated with faulting and fracturing generally decreases with depth.

**Table 7.11 Aquifer hydraulic properties**

| Hydraulic properties                             | Sherwood Sandstone           | Helsby Sandstone             | Wilmslow Sandstone           | Chester Pebble Beds          | Collyhurst/Kinnerton Sandstone |
|--------------------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|
| <b>Core hydraulic conductivity (range) (m/d)</b> | 3.7 x 10 <sup>-5</sup> to 15 | 3.1 x 10 <sup>-4</sup> to 15 | 2.6 x 10 <sup>-4</sup> to 13 | 2.5 x 10 <sup>-4</sup> to 15 | 3.7 x 10 <sup>-5</sup> to 10   |

- 7.6.58 There is no observable cementation variation with depth within the top 200m of the freshwater aquifers. Core data for these depths show a scatter range of

<sup>98</sup> Table 7.5.3 from Allen, D J, Brewerton, L J, Coleby, L M, Gibbs, B R, Lewis, M A, MacDonald, A M, Wagstaff, S J, and Williams, A T. 1997. The physical properties of major aquifers in England and Wales. British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R&D Publication 8.

porosity of approximately 10-35%. The dominant contribution to specific storage comes from the aquifer and typical values of storage coefficient of the aquifer are  $10^{-5}$  to  $10^{-3}$ . Given the porosity of the sandstones, the unconfined values of storage coefficient for the Permo-Triassic sandstones are likely to be broadly in the range  $10^{-2}$  to  $10^{-1}$ .

- 7.6.59 Significant hydraulic conductivity increases can be attributed to fracture flow and hydraulic conductivity values obtained in fractured sections are generally much higher than in the unfractured sections. A zone of high hydraulic conductivity exists in the top part of the aquifer where fractures are common, whereas underlying this is a low hydraulic conductivity zone (generally less than 1m/d) where intergranular flow predominates and fractures are rare.
- 7.6.60 The hydraulic effects of faults in the Permo-Triassic sandstones vary widely, ranging from impermeable features which form barriers to groundwater flow, to highly transmissive structures, which may act as recharge boundaries<sup>99</sup>.

### *Aquifer Water Quality*

- 7.6.61 The water in the Permo-Triassic sandstones is generally of good quality and the aquifer has in consequence been extensively exploited for a wide range of uses. Groundwater chemistry varies both with depth and laterally, towards the feather edge of the aquifer or down dip beneath the confining Mercia Mudstone Group. The water in the unconfined sandstones is generally oxic and of a calcium bicarbonate type with subsidiary magnesium and sulphate ions and very minor sodium and chloride ion concentrations.
- 7.6.62 The age of groundwaters is generally less than one hundred years old, this being approximately the time taken from recharge to discharge at springs, rivers or by borehole abstraction. The potential for saline intrusion exists in the Liverpool area and along the tidal reaches of the Mersey.
- 7.6.63 Aquifers within the Study Area are vulnerable to urban, agricultural and industrial pollution. Agricultural land use may give rise to diffuse and point source pollution by nitrate and pesticides. There is significant current and historical industrial land use in the area including oil refining, salt production, coal mining, manufacturing industry and chemical processing mainly concentrated in the north of the area along the Mersey Estuary at Ellesmere Port, Stanlow, Helsby and Runcorn. To the east of the Study Area, around Northwich and Winsford, extensive salt production has taken place. These industrial areas pose a large potential contamination threat to groundwater and surface water and there are a number of known areas of contamination. A number of major railways and roads traverse the area including the M56 and M6 motorways. The Manchester Ship Canal runs adjacent to the Mersey Estuary in the north of the Study Area.

<sup>99</sup> Allen, D J, Brewerton, L J, Coleby, L M, Gibbs, B R, Lewis, M A, MacDonald, A M, Wagstaff, S J, and Williams, A T. 1997. The physical properties of major aquifers in England and Wales. British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R&D Publication 8.

- 7.6.64 Concentrations of some chemicals are elevated in groundwater above the natural baseline due to pollution in the Study Area<sup>100</sup>. For example, elevated nitrate, pesticides and chloride concentrations may indicate modification by agricultural and hydrocarbons and other chemicals due to industrial practices. The most obvious indicator of diffuse pollution is the presence of high nitrate, although nitrate concentrations are naturally generally low throughout much of the aquifer due to relatively reducing conditions, which occur in confined parts of the aquifer,. Anthropogenic inputs of nitrate have been reduced by denitrification. In some parts of the aquifer, arsenic, barium and uranium occur at concentrations, which exceed drinking water standards. However, these concentrations are not considered to be the impact of pollution, they result from water-rock interaction and reflect aquifer mineralogy.
- 7.6.65 Vulnerability of the primary aquifer and other secondary aquifers to surface contamination in the Study Area is likely to be largely a function of the thickness and permeability of overlying superficial deposits or the absence thereof.

### Abstractions

- 7.6.66 The Study Area covers three Catchment Abstraction Management Strategy (CAMS) areas, the Upper Mersey<sup>101</sup>, Lower Mersey<sup>102</sup> and Weaver and Dane<sup>103</sup>. The Upper Mersey CAMS area covers a small part of the northeast part of the Study Area between Broomedge and Partington and indicates that both surface and groundwater are classed as *Water Available* areas within the Study Area. A small area north of Broomedge is classified as *Restricted Water Available*.
- 7.6.67 The Lower Mersey CAMS area covers areas directly around the River Mersey and Manchester Ship Canal, and areas north of the Mersey, as well as parts of the West Corridor around Helsby. Areas classified as *No Water Available* are present around St Helens, Lymm and Runcorn. Areas classified as *Limited Water Available* are Warrington, Helsby and Daresbury. Where Ground Water Management Units are present, these are classified as *Restricted Water Available* within the Study Area.

<sup>100</sup> BGS and EA - Baseline Report Series: 2. The Permo-Triassic Sandstones of west Cheshire and the Wirral Groundwater Systems and Water Quality Commissioned Report CR/02/109N.

<sup>101</sup> Environment Agency (2013). Upper Mersey Abstraction Licensing Strategy. (online). Available at: <https://www.gov.uk/government/publications/upper-mersey-abstraction-licensing-strategy> (Accessed 9 June 2022).

<sup>102</sup> Environment Agency (2013). Lower Mersey and Alt Abstraction Licensing Strategy. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/300490/LIT\\_7881\\_35d3ed.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/300490/LIT_7881_35d3ed.pdf) (Accessed 9 June 2022).

<sup>103</sup> Environment Agency (2020). Weaver and Dane Abstraction Licensing Strategy. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/938206/Weaver-and-Dane-abstraction-licensing-strategy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938206/Weaver-and-Dane-abstraction-licensing-strategy.pdf) (Accessed 9 June 2022).

- 7.6.68 The Weaver and Dane CAMS area covers the southern part of the Study Area. A limited area classified as *Water Unavailable* is present directly northeast of Northwich and areas of *Limited Water* available are also present to the south and west of Northwich. Where Groundwater Management Units are present, the area around Frodsham is classified as *Restricted Water Available*. For the Abstraction Licensing Strategy reports published in 2013,<sup>101,102</sup> information provided in these documents may no longer be representative due to the effects of climate change and changing demand.
- 7.6.69 The Environment Agency was contacted to obtain details on licensed abstractions within the Study Area. **Appendix 7A** provides details of the 161 licensed abstractions (with licensed volumes and purpose of abstraction) that have been identified and screened as receptors based on their presence within the Zol (for surface water abstractions) and hydraulic pathways. This includes 104 groundwater abstractions, ten public water supply groundwater abstractions, and 49 surface water abstractions (**Figure 7.6**).
- 7.6.70 Local authorities were contacted for PWS information, but all councils either did not hold the information, did not respond to the data request or the PWS locations supplied were found to be outside of the Study Area.
- 7.6.71 Groundwater abstractions are spread across the Study Area, with clusters around the Walton area of the Manchester Ship Canal located on the Warrington Spur, Cuerdley on the North Corridor and Great Budworth located between the Northwich Spur and East Corridor.
- 7.6.72 The Study Area intersects multiple SPZs<sup>104</sup> which are classified as safeguard zones for public water supply groundwater abstractions. This includes a continuous area of Total Catchment SPZ3 across the northern part of the Study Area and five Inner Protection Zones SPZ1 associated with the Triassic Sandstone aquifer. No SPZ1 are intersected by the Preliminary Order Limits. The nearest SPZ1s to the Preliminary Order Limits are located at Daresbury (North Corridor) and another at Higher Walton (North Corridor), approximately 250m and 480m away respectively. An area of SPZ2c<sup>105</sup> is present around the Higher Walton SPZ1 approximately 20m from the Preliminary Order Limits and a limited area of SPZ2 is also present within the Preliminary Order Limits within the same locality.
- 7.6.73 The majority of surface water abstractions are located in the South Corridor of the Study Area around the wider Northwich area, with other clusters in the East Corridor, centred around Heatley, the North Corridor, centred around Warrington, and the West Corridor, centred around the Stanlow area of the Manchester Ship Canal. A Drinking Water Protected Area (DWPA) is also present at the edge of

<sup>104</sup> SPZ1 has a 50-day travel time from pollutant to source with a 50m default minimum radius. SPZ2 has a 400-day travel time of pollutant to source and has a 250m or 500m minimum radius around the source depending on the amount of water taken. SPZ3 is the area around a supply source within which all the groundwater ends up at the abstraction point.

<sup>105</sup> Zones 1c, 2c and 3c are extended zones beneath protected cover, where protective geology cover such as clay is present. Activities below the surface, such as deep drilling, could create pathways for pollutants to enter the groundwater.

the Study Area at Winwick Quay (likely associated with UU public water supply abstraction at Winwick), Warrington (North Corridor), shown on the Defra MAGIC website.

### Discharges

- 7.6.74 The Environment Agency supplied data on all permitted discharges to both ground and surface water within the Study Area (262 in total). Only four of these discharges were found to be located within the Preliminary Order Limits. The location of the discharges is shown on **Figure 7.6**.

### Water Quality and Water Framework Directive status

- 7.6.75 **Appendix 7A** contains full details of the current (2019 Cycle 2)<sup>106</sup> status of all the WFD water bodies within the Study Area, including both surface and groundwater WFD bodies. This further information includes information on the WFD condition, supporting elements, objectives and reasons for not achieving a "Good" status. This is summarised briefly below.
- 7.6.76 There are 20 WFD river water bodies within the Study Area. (Information on the river water bodies is included in **Table 2-1** of **Appendix 7A**.) Ten of the water bodies are designated as being Heavily Modified. None of the river water bodies are currently attaining "Good" status/potential, with all classed at "Moderate" or "Poor" status/potential. The location of the WFD river water bodies is shown in **Figure 7.2**. The most common reasons for not achieving "Good" status/potential<sup>107</sup> are urbanisation, continuous sewage discharges, poor soil, livestock and nutrient management.
- 7.6.77 There are five canal WFD water bodies within the Study Area, as shown on **Figure 7.2**. **Table 2-3** of **Appendix 7A** contains details of the classification of the canals, with all of them being at "Moderate" potential.
- 7.6.78 There is one WFD Transitional water body within the Study Area, the Mersey. Its location is shown in **Figure 7.2**. The Mersey transitional water body is at "Moderate" status, with full classification details included in **Table 2-4** of **Appendix 7A**. The main reasons for not achieving "Good" status are contaminated land and contaminated water body bed sediments.
- 7.6.79 There are three WFD lake water bodies within the Study Area, as shown on **Figure 7.2**. **Table 2-5** of **Appendix 7A** contains details of the classification of the lakes, with all of them being at "Moderate" status.
- 7.6.80 There are also three 'non-reportable' coastal catchments also within the Study Area, these are shown on **Figure 7.2**. No WFD classification information is available for these as they are not routinely monitored by the Environment Agency.

<sup>106</sup> While draft Cycle 3 RMPs are currently out for consultation, they are not yet published. As such, Cycle 2 data has been used in this assessment.

<sup>107</sup> Where WFD water bodies are deemed to be artificial or heavily modified water bodies, then under WFD they need to achieve "Good" ecological potential, rather than "Good" ecological status

- 7.6.81 With regards to the WFD groundwater bodies, five are present within the Study Area, as shown on **Figure 7.5. Table 2-2 of Appendix 7A** contains details on the classification of the groundwater bodies. All five are at “Poor” status. The predominant issues preventing the attainment of “Good” status are poor nutrient and livestock management, with also abandoned mines, saline intrusion and private sewage treatment.

### Conservation Sites

- 7.6.82 **Appendix 7A** contains details of all of the water dependent nature conservation sites within the Zol<sup>108,109</sup>. **Table 2-6** of this appendix includes all of the nature conservation sites with a hydrological or hydrogeological component to their designation within the water environment study area. In total, 38 conservation sites have been identified with the site designations comprising Sites of Special Scientific Interest (SSSI), SPA, Ramsar sites, LNR, LWS. No Special Areas of Conservation (SAC) or National Nature Reserves (NNR) were identified within the Zol and no Local Geological Sites were screened in.

### Flood Risk

- 7.6.83 This section provides an overview of the baseline sources of flood risk within the Preliminary Order Limits. A Preliminary Flood Risk Assessment has been provided within **Appendix 7B** that considers each of these sources of flood risk in more detail.

#### Fluvial and tidal flood risk

- 7.6.84 The Environment Agency Flood Map for Planning<sup>110</sup> provides an indication of the likelihood of flooding from fluvial and or tidal sources, with Flood Zones 1, 2, and 3 indicating a low, medium and high annual probability of flooding, respectively. The Environment Agency Flood Map for Planning is shown in **Figure 7.7**.

#### West Corridor

- 7.6.85 The West Corridor is within a number of Flood Zone 3 (high likelihood of fluvial or tidal flooding) and Flood Zone 2 (medium likelihood of fluvial or tidal flooding) areas. Flooding affects the eastern part of the West Corridor associated with fluvial flooding from the River Weaver. Closer to the coast, Flood Zone 2 and 3 areas are likely to be a mix of fluvial and tidal sources associated with the River Mersey and the Manchester Ship Canal.

<sup>108</sup> It has been assumed the 500m upstream buffer of the Zol is likely to include any shallow groundwater feeds to conservation sites. Deeper groundwater feeds to conservation sites are unlikely given the hydrogeological setting, or included within larger WFD water bodies.

<sup>109</sup> It has been assumed the 500m upstream buffer of the Zol is likely to include any shallow groundwater feeds to conservation sites. Deeper groundwater feeds

<sup>110</sup> Environment Agency (2021). Flood Map for Planning. (online). Available at: <https://flood-map-for-planning.service.gov.uk/> (Accessed 21 November 2021)

- 7.6.86 Near Elton, areas of Flood Zone 2 and 3 are associated with the River Gowy and Thornton Brook. Flood defences are present in the form of embankments and engineered high ground. Between Frodsham and Elton, large parts of the Preliminary Order Limits located in Flood Zone 2 and 3 are shown as areas benefitting from flood defences.

### *North Corridor*

- 7.6.87 The North Corridor is within a number of Flood Zone 3 (high likelihood of fluvial or tidal flooding) and Flood Zone 2 (medium likelihood of fluvial or tidal flooding) areas<sup>111</sup>. The North Corridor (on the Mersey crossing) and the Warrington Spur intersects a large area of Flood Zone 3 and Flood Zone 2 associated with the River Mersey and its tributaries. The River Mersey is a tidal watercourse in this reach, as such associated Flood Zones are likely to be associated with both tidal and fluvial flooding. Flood defences are present along sections of the Mersey and are a mixture of natural and engineered high ground, embankments and walls. Flood gates are also present in two locations at Warrington substation and one near Woolston Weir. Areas benefitting from flood defences are located primarily on both banks of the River Mersey. However, these defences could be overtopped or could breach, which could cause extensive flooding of the land with significant flood depths and high velocities.
- 7.6.88 Further north on the North Corridor an area of Flood Zone 2 and 3 associated with Penketh Brook is present to the south-east of Bold Heath. The river is bordered by embankments (Environment Agency flood defences) on both sides. Around Sutton Manor, areas of Flood Zone 2 and 3 are present in the Preliminary Order Limits, associated with Pendlebury Brook. Flood defences are present in the form of embankments, engineered high ground and natural high ground.

### *East Corridor*

- 7.6.89 The East Corridor is within a number of Flood Zone 3 and Flood Zone 2 areas. An area of Flood Zone 2 and 3 crosses the Preliminary Order Limits in the south-west of the East Corridor near Lower Whitley, associated with Whitley Brook. Flood defences are present in the form of natural high ground<sup>112</sup>. However, these defences could be overtopped or could breach, which could cause extensive flooding of the land with significant flood depths and high velocities.
- 7.6.90 In the central area of the East Corridor, areas of Flood Zone 2 and 3 intersect the Preliminary Order Limits, associated with Gale Brook to south of Arley, and Arley Brook and Northwood Drain to the north and east. All three watercourses have flood defences consisting of natural high ground.

<sup>111</sup> Flood Zone 3 is formally defined as land having a 1% Annual Exceedance Probability (AEP) or greater of fluvial flooding or a fluvial flooding, or a 0.5% AEP or greater of tidal flooding. Flood Zone 2 is defined as land having between a 0.1% and 1% AEP of fluvial flooding, or between a 0.1% and 0.5% AEP of tidal flooding.

<sup>112</sup> These features relate to reaches of river which have natural banks, but over which the EA exercise maintenance for flood defence reasons (such as dredging and bank clearance) to maintain conveyance. So, although these are shown as an EA flood defence they are probably not flood defences as such, more like maintained channels.

- 7.6.91 In the north of the East Corridor areas of Flood Zone 2 and 3 intersect the Preliminary Order Limits, associated with flooding from the River Bollin, Old Bollin Brook, Agden Brook and its unnamed tributary. Flood defences in the form of natural high ground are present along the left banks of the River Bollin and Agden Brook, and present on both banks of the Old Bollin and unnamed Agden Brook tributary. No areas are shown as currently benefitting from flood defences on the East Corridor.

### *South Corridor*

- 7.6.92 The South Corridor is also associated with areas of Flood Zone 2 and Flood Zone 3. The River Weaver Navigation crosses the Preliminary Order Limits near Acton Bridge. Flood defences are present consisting of embankments and natural high ground. Areas of Flood Zone 2 and 3 are also present around Cuddington, associated with Cuddington Brook, Acton Brook and Grange Brook. Flood defences consisting of natural high ground are present along Cuddington Brook and Acton Brook, but no flood defences are present on Grange Brook which crosses the Preliminary Order Limits.
- 7.6.93 Areas of Flood Zone 2 and 3 are present around Northwich associated with the River Dane and River Weaver. Flood defences consisting of natural high ground are present on the River Dane and River Weaver, and the River Weaver also has areas of embankments. Northwich has areas designated as benefitting from flood defences and these defences comprise a series of flood gates, demountable defences and flood walls according to the Environment Agency flood defence dataset. The River Dane, River Weaver and Ship Brook also intersects the Preliminary Order Limits to the east and west of Moulton. Flood defences consisting of natural high ground are present.

### *Groundwater flood risk*

- 7.6.94 The British Geological Society (BGS) Areas Susceptibility to Groundwater Flooding (AStGWF) map indicate the Preliminary Order Limits contain a number of areas where there is potential for groundwater flooding to occur as a result of extended periods of intense rainfall. Additionally, there are a number of other areas where there is a potential risk of groundwater flooding for below ground construction activities. These areas of potential groundwater emergence generally coincide with watercourse valley floors, productive superficial deposits and soils.

### *West Corridor*

- 7.6.95 The Cheshire West and Chester Council PFRA<sup>113</sup> states that there are known locations with high groundwater levels within the council area. There are no specific records or reported incidents of groundwater flooding within the areas of

<sup>113</sup> Cheshire West and Chester Council (2017). Preliminary Flood Risk Assessment. (online). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/698398/PFRA\\_Cheshire\\_West\\_and\\_Chester\\_Council\\_2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698398/PFRA_Cheshire_West_and_Chester_Council_2017.pdf) (Accessed 26 November 2021).

the Study Area within the Cheshire West and Chester Council area. The bedrock geology of the West Corridor is largely classed as being a Principal Aquifer. However, local topography is a determining factor in groundwater flood risk so the presence of a Principal Aquifer does not necessarily indicate a high risk, merely that it is capable of being an area at high risk where the water table intersects the ground surface. However, the superficial deposits beneath much of the West Corridor are classed as being Secondary (undifferentiated) Aquifers which indicates a very low risk of groundwater emergence.

### *North Corridor*

- 7.6.96 The St Helens PFRA<sup>114</sup> reviewed the AStGWF data set and Environment Agency and Council flooding records and concluded that there is no locally significant risk of groundwater flooding in the Borough. It can therefore be concluded that there is no locally significant risk of groundwater within the areas of the Study Area situated within the St Helens Council area.
- 7.6.97 Much of the North Corridor including Warrington and the area surrounding and north of the River Mersey are classed as being above a bedrock Principal Aquifer. This indicates it is highly transmissible and may carry a greater quantity of groundwater which may pose a risk of groundwater flooding, should the water table rise above ground level. However, the superficial deposits beneath much of the North Corridor are classed as being Secondary (undifferentiated) Aquifers, which indicates a very low risk of groundwater emergence. Local topography is often a key determining factor in groundwater emergence so the presence of a Principal Aquifer does not necessarily mean that there is a high risk of groundwater emergence.

### *East Corridor*

- 7.6.98 The Cheshire East Preliminary Flood Risk Assessment (PFRA)<sup>115</sup> reviewed the Environment Agency's AStGWF data set. No parts of the Study Area, within the Cheshire East Council area, were deemed to be at risk of groundwater flooding. The PFRA also showed that there are no records of groundwater flooding within the Study Area coincident with the Cheshire East Council area.
- 7.6.99 The bedrock geology around Partington is designated as a Principal Aquifer and the superficial geology has areas of both Secondary A Aquifer and Secondary Unproductive Aquifer. However, local topography is a determining factor in groundwater flood risk so the presence of a Principal Aquifer does not necessarily indicate a high risk, merely that it is capable of being an area at high risk where the water table intersects the ground surface.

<sup>114</sup> St Helens Council Preliminary Flood Risk Assessment 2017-23 version (PFRA 2017-23) (online). Available at: [pfra\\_2017\\_version\\_1d](https://www.sthelens.gov.uk/pfra_2017_version_1d) (sthelens.gov.uk) (Accessed 13 May 2022).

<sup>115</sup> Cheshire East Council (2017). Preliminary Flood Risk Assessment. (online). Available at: [PFRA\\_Cheshire\\_East\\_Council\\_2017.pdf](https://publishing.service.gov.uk/pfra_cheshire_east_council_2017.pdf) (publishing.service.gov.uk) (Accessed 26 November 2021).

*South Corridor*

- 7.6.100 The Cheshire West and Chester Council PFRA<sup>113</sup> states that there are known locations with high groundwater levels within the Borough. There are no specific records or reported incidents of groundwater flooding within the areas of the Study Area within the Cheshire West and Chester Council area. The bedrock geology of the South Corridor is predominantly Secondary B Aquifer, with some areas of Unproductive Aquifer around Moulton indicating that groundwater flooding is unlikely. The superficial deposits beneath much of the South Corridor are classed as being Secondary (undifferentiated) Aquifers which indicates a very low risk of groundwater emergence.

*Surface water flood risk*

- 7.6.101 The Environment Agency Risk of Flooding from Surface Water map<sup>116</sup> (**Figure 7.8**) shows that there are areas at risk of surface water flooding throughout the Study Area. These are particularly associated with low lying areas around watercourse, urban areas, localised depressions and areas of managed drainage.

*West Corridor*

- 7.6.102 The West Corridor has major flow paths associated with the river corridors mentioned in the fluvial flood risk section also being areas of surface water flood risk, particularly the River Weaver and its tributaries north of Acton Bridge. Areas of surface water accumulation are present at Frodsham and Helsby and intersect the Preliminary Order Limits at multiple points but are minimal with limited, confined spatial extents.
- 7.6.103 The Cheshire West and Chester Council SFRA (2016)<sup>117</sup> states that based on the Flood Map for Surface Water, surface water flooding is prevalent across the Borough over the flat ground, where surface water is able to accumulate and the higher ground of the central area of the Borough is much less at risk.

*North Corridor*

- 7.6.104 The North Corridor has significant areas of surface water accumulation, with the river corridors mentioned in the fluvial flood risk section also being areas of surface water flood risk due to their low-lying topography, particularly the River Mersey, Manchester Ship Canal and Penketh Brook. Major areas of surface water accumulation occur in localised depressions and existing water bodies. Contour parallel features such as the M62 and railway embankments are also areas of accumulation. Flow paths in urban areas are prevalent and associated

<sup>116</sup> Environment Agency (2021). Long term flood risk service. (online). Available at: <https://check-long-term-flood-risk.service.gov.uk/map> (Accessed 03 May 2022).

<sup>117</sup> Cheshire West and Chester Council (2016). Strategic Flood Risk Assessment, (online). Available at: [https://consult.cheshirewestandchester.gov.uk/portal/cwc\\_ldf/cw\\_lp\\_part\\_two/ev\\_base/sfra2016?tab=files](https://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/cw_lp_part_two/ev_base/sfra2016?tab=files) (Accessed 18 November 2021).

with roads. Major flow paths are present on the Walton Hall, Warrington and Sherdley Park golf courses.

- 7.6.105 The St Helens SFRA<sup>118</sup> states that surface water flooding can occur anywhere in the St Helens Council area where ground levels and profiles cause surface water to flow and accumulate, however they are yet to produce a Surface Water Management Plan and are awaiting further information regarding the areas surface water risk. The St Helens PFRA<sup>114</sup> has identified that there have been no recorded historically significant harmful consequences from surface water flooding.

### *East Corridor*

- 7.6.106 The East Corridor has major flow paths associated with the river corridors mentioned in the fluvial flood risk section also being areas of surface water flood risk, particularly the River Bollin, Sinderland Brook, Gale Brook, Whitley Brook and Northwood Drain. Major accumulation areas are associated with topographic lows and a large area of surface water flood risk intersecting the Preliminary Order Limits are present to the north of Arley associated with the Northwood Drain watercourse and near Lower Whitley associated with the Whitley Brook corridor.
- 7.6.107 The Cheshire East SFRA<sup>119</sup> states there the overall risk of surface water flooding is moderate, this is due to the flat level of the topography and a number of culverted ordinary watercourses in urban areas.

### *South Corridor*

- 7.6.108 Major surface water flow paths on the South Corridor are associated with the river corridors mentioned in the fluvial flood risk section also being areas of surface water flood risk, particularly the River Dane, River Weaver and Whitley Brook. Major areas of surface water flood risk intersect the Preliminary Order Limits near Acton Bridge, associated with the River Weaver corridor.
- 7.6.109 The Cheshire West and Chester Council SFRA (2016)<sup>120</sup> states that based on the Flood Map for Surface Water, surface water flooding is prevalent across the Borough over the flat ground where surface water is able to accumulate and the higher ground of the central area of the Borough is much less at risk.

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<sup>118</sup> JBA Consulting (2014). St Helens Council Strategic Flood Risk Assessment Final Report. (online) Available at: <https://www.sthelens.gov.uk/media/329412/flo001-st-helens-council-strategic-flood-risk-assessment-2014.pdf> (Accessed 3 May 2022).

<sup>119</sup> JBA Consulting (2013). Cheshire East Council Strategic Flood Risk Assessment Final Report. (Online) Available at: <https://www.cheshireeast.gov.uk/pdf/planning/spatial-planning/researchand-evidence/strategic-flood-assessment/cheshire-east-council-sfra-final-report-v4.0.pdf> (Accessed 3 May 2022).

<sup>120</sup> Cheshire West and Chester Council (2016). Strategic Flood Risk Assessment, (online). Available at: [https://consult.cheshirewestandchester.gov.uk/portal/cwc\\_ldf/cw\\_lp\\_part\\_two/ev\\_base/sfra2016?tab=files](https://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/cw_lp_part_two/ev_base/sfra2016?tab=files) (Accessed 18 November 2021).

### *Sewer flood risk*

7.6.110 The risk of flooding from sewers is likely to be limited to where the Preliminary Order Limits intersects urban areas (of which they are only limited extents with the Preliminary Order Limits). A review of the SFRAs for the Study Area determines that there are no concentrated areas of high sewer flood risk within the Preliminary Order Limits, except for the St. Helens Town Centre in the North Corridor that has been identified as an area at high risk of sewer flooding due to a high number of recorded sewer flooding incidents relative to the surrounding areas. No further sewer flooding data was available at this time for further analysis.

7.6.110.1 **Chapter 7: Appendix B** pFRA highlights that above ground permanent infrastructure is predominantly proposed in rural (greenfield) or industrial (brownfield) areas. None of the permanent above ground infrastructure locations coincide with known areas of sewer flooding and the Project will not require integration into any existing sewer networks.

### *Canal flood risk*

7.6.111 Five canals are present within the Study Area: Bridgewater Canal, Manchester Ship Canal, Sankey Canal, Trent and Mersey Canal, and Weaver Navigation. Whilst the impact of flooding from these structures may be high, the risk associated with the structures is low as they are actively maintained structures and the volume of water associated with flooding from canals (with the exception of the Manchester Ship Canal) is limited. They do however pose a residual risk as a consequence of a breach if the canal is impounded and raised above ground. At this stage no condition information has been requested for all the canal assets (embankments, aqueducts and culverts) so it is not possible to assess the hazard posed and the likelihood of a canal breach. This will be assessed as part of the FRA for DCO.

### *West Corridor*

7.6.112 The Trent and Mersey Canal intersects the Preliminary Order Limits on the West Corridor directly to the west of the Central Hub Search Area, where the canal is cut and is broadly contour parallel. Therefore, the downslope area of the Preliminary Order Limits to the south-west would be more at risk in the event of canal flooding. The Weaver Navigation Canal also intersects the Preliminary Order Limits to the west of Sutton Weaver. The Weaver Navigation Canal is embanked in the sections of the canal within the Preliminary Order Limits, with higher elevations on the right bank meaning the downslope areas of the left bank are more at risk in the event of canal flooding.

### *North Corridor*

7.6.113 Three canals intersect the Preliminary Order Limits on the North Corridor either side of the River Mersey: the Bridgewater Canal, the Manchester Ship Canal and the Sankey Canal. All three canals are predominantly not embanked and are lower than their immediate surroundings at the locations (hereafter referred to as 'cut' canals), which reduces the risk of a breach, where they intersect the

Preliminary Order Limits. For the Manchester Ship Canal, the extent of flooding can be seen from the Environment Agency Flood Map for Planning.

### *East Corridor*

- 7.6.114 The Bridgewater Canal intersects the Preliminary Order Limits north of Broomedge. Within the Preliminary Order Limits Bridgewater Canal is predominantly a cut canal, which reduces the risk of a breach.

### *South Corridor*

- 7.6.115 The Trent and Mersey Canal intersects the Preliminary Order Limits on the Northwich Spur, near Anderton, and north of Acton Bridge on the South Corridor. Near Anderton, the Trent and Mersey Canal is cut, with a steep embankment adjacent on the right bank. On the South Corridor, north of Acton Bridge, the Canal is cut which reduces the risk of a breach.

### *Reservoir failure flood risk*

- 7.6.115.2 The Environment Agency's Reservoir Flood Maps (RFM) detail where water may go in the unlikely event of a dam or reservoir failure. The Reservoir Flood Maps include two scenarios: a 'dry-day' and a 'wet-day'. The 'dry-day' scenario is defined as "*the flooding that would occur if the dam or reservoir failed when rivers are at normal levels*". The 'wet day' scenario assesses "*how much worse the flooding might be if a river is already experiencing an extreme natural flood*". In a 'dry' scenario, where river flows are typical at the time of reservoir failure the risk of flooding from reservoir extents are generally smaller than the fluvial Flood Zones. Only in a 'wet' scenario, where a river is in flood at the time of reservoir failure do the risk of flooding from reservoir extents in some places exceed the Flood Zones.

### *West Corridor*

- 7.6.116 The Environment Agency Reservoir Flood Extents layer indicates that flooding affecting the West Corridor has flood extents conveyed primarily through the River Weaver corridor, crossing the Preliminary Order Limits at Frodsham and Elton.

### *North Corridor*

- 7.6.117 The Environment Agency Reservoir Flood Extents layer indicates that a large number of reservoirs located upstream of the Study Area have flood extents that confluence along the River Mersey and Manchester Ship Canal corridor. As such, the parts of the North Corridor to be affected in the event of reservoir failure are the parts of the Preliminary Order Limits that cross the River Mersey and the Manchester Ship Canal. The Warrington Spur is also affected. The northern part of the North Corridor around St Helens is also shown to be impacted by the failure of reservoirs located outside of the Study Area, with reservoir flooding crossing the Preliminary Order Limits near Sutton Manor.

*East Corridor*

- 7.6.118 The Environment Agency Reservoir Flood Extents layer indicates that a large number of reservoirs located upstream of the Study Area have flood extents that confluence along the River Mersey and Manchester Ship Canal corridor, affecting Partington and Lymm in the eastern part of the Study Area. Multiple reservoir flood extents also confluence along the River Bollin and Sinderland Brook corridors, crossing the Preliminary Order Limits to the south of Dunham Massey and to the east of Partington respectively.

*South Corridor*

- 7.6.119 The Environment Agency Reservoir Flood Extents layer indicates that a number of reservoirs located upstream of the Study Area have flood extents conveyed primarily through the River Dane and River Weaver corridors, crossing the Preliminary Order Limits to the east and west of Moulton, and further north near Acton Bridge. The Northwich Spur is also affected, with reservoir flooding associated with the River Weaver corridor crossing the Preliminary Order Limits near Anderton.

**Future baseline**

- 7.6.120 This section sets out how the current baseline is predicted to change in the absence of the Project by the time the Project is in operation. This should reflect changes in the baseline that might be expected to result from natural changes (e.g. changes in habitat condition etc.) or as a result of climate change, or from the presence of additional development within the Zol.

**Climate change**

- 7.6.121 As a result of climate change, it is predicted that winters will become generally wetter and summers generally drier. It is also likely that peak rainfall intensities could increase, and that the magnitude of flood events could also increase as a consequence. The Environment Agency provides guidance<sup>121</sup> on the potential future increases in river flood flows and extreme rainfall intensity to guide flood risk assessments. The potential increases in these parameters should be taken account over the development's expected lifetime.
- 7.6.122 The Environment Agency Guidance states that for essential infrastructure the higher central climate change allowances should be used for both the design, and when assessing safe access and egress. The Study Area covers three different management catchments and within each of these the peak river flows have varying amounts of potential change (**Table 7.12**). The Environment Agency also provides guidance on the potential future increases in peak rainfall intensity in small catchment or urban drainage catchments, included in (**Table 7.13**). These values are also provided at the management catchment scale and

<sup>121</sup> Environment Agency (2022). Flood risk assessments: climate change allowances, (online). Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (Accessed 28 June 2022)

both the central and upper end allowances will need to be taken account of in the design of sustainable drainage and flood risk from pluvial flooding.

**Table 7.12 Environment Agency peak river flow climate change allowances (% increase relative to 1981 to 2000 baseline)**

| Allowance category                                          | Potential change anticipated for the 2020s | Potential change anticipated for the 2050s | Potential change anticipated for 2080s |
|-------------------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------|
| <b>Peak river flows – Weaver Gowy Management Catchment</b>  |                                            |                                            |                                        |
| Central                                                     | 19%                                        | 30%                                        | 52%                                    |
| Higher central                                              | 24%                                        | 40%                                        | 67%                                    |
| Upper                                                       | 36%                                        | 64%                                        | 106%                                   |
| <b>Peak river flows – Lower Mersey Management Catchment</b> |                                            |                                            |                                        |
| Central                                                     | 18%                                        | 27%                                        | 44%                                    |
| Higher central                                              | 22%                                        | 35%                                        | 57%                                    |
| Upper                                                       | 32%                                        | 55%                                        | 90%                                    |
| <b>Peak river flows – Upper Mersey Management Catchment</b> |                                            |                                            |                                        |
| Central                                                     | 13%                                        | 22%                                        | 41%                                    |
| Higher central                                              | 17%                                        | 31%                                        | 53%                                    |
| Upper                                                       | 27%                                        | 51%                                        | 85%                                    |

**Table 7.13 Environment Agency peak rainfall intensity allowances (% increase relative to 1981 to 2000 baseline)**

| Allowance category                                                    | Total potential change anticipated for the '2050s' (to 2060) | Total potential change anticipated for the '2070s' (2061 to 2125) |
|-----------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Peak rainfall – Lower Mersey Management Catchment – 3.33% AEP*</b> |                                                              |                                                                   |
| Upper                                                                 | 35%                                                          | 40%                                                               |
| Central                                                               | 20%                                                          | 30%                                                               |
| <b>Peak rainfall – Lower Mersey Management Catchment – 1% AEP</b>     |                                                              |                                                                   |
| Upper                                                                 | 40%                                                          | 45%                                                               |
| Central                                                               | 25%                                                          | 30%                                                               |

| Allowance category                                                   | Total potential change anticipated for the '2050s' (to 2060) | Total potential change anticipated for the '2070s' (2061 to 2125) |
|----------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Peak rainfall – Upper Mersey Management Catchment – 3.33% AEP</b> |                                                              |                                                                   |
| Upper                                                                | 35%                                                          | 40%                                                               |
| Central                                                              | 20%                                                          | 30%                                                               |
| <b>Peak rainfall – Upper Mersey Management Catchment – 1% AEP</b>    |                                                              |                                                                   |
| Upper                                                                | 40%                                                          | 45%                                                               |
| Central                                                              | 25%                                                          | 30%                                                               |
| <b>Peak rainfall – Weaver Gowy Management Catchment – 3.3% AEP</b>   |                                                              |                                                                   |
| Upper                                                                | 35%                                                          | 40%                                                               |
| Central                                                              | 20%                                                          | 25%                                                               |
| <b>Peak rainfall – Weaver Gowy Management Catchment – 1% AEP</b>     |                                                              |                                                                   |
| Upper                                                                | 40%                                                          | 45%                                                               |
| Central                                                              | 25%                                                          | 30%                                                               |

\*AEP – Annual Exceedance Probability

7.6.123

The Environment Agency also provides guidance on climate change induced future sea level rise<sup>143</sup> This can be seen in **Table 7.14** as the whole of the Study Area is within the north-west river basin district, only these predicted sea level rises have been included. This will need to be accounted for in the design of the Project in low lying areas adjacent to tidal water bodies as the design is refined and all specific elements are assessed. As the Project is a Nationally Significant Infrastructure Project, the Environment Agency Guidance requires that the H++ credible maximum scenario<sup>122</sup> for sea level rise (1.9m for the total sea level rise to 2100) will also need to be assessed, along with sensitivity test allowances for offshore wind speed and extreme wave height and an additional 2mm for each year on top of sea level rise allowances from 2017 for storm surge.

<sup>122</sup> The H++ sea level rise allowance is part of assessing credible maximum scenarios for NSIPs and uses 1.9m for the total sea level rise to 2100 to ensure that the development can be adapted to large scale climate change over its lifetime.

**Table 7.14 Environment Agency sea level allowances for the North West river basin district for each epoch in mm for each year (based on a 1981 to 2000 baseline)**

| Allowance category | 2000 to 2035 (mm) | 2036 to 2065 (mm) | 2066 to 2095 (mm) | 2096 to 2125 (mm) | Cumulative rise 2000 to 2125 (m) |
|--------------------|-------------------|-------------------|-------------------|-------------------|----------------------------------|
| Higher central     | 4.5 (158)         | 7.3 (219)         | 10 (300)          | 11.2 (336)        | 1.01                             |
| Upper end          | 5.7 (200)         | 9.9 (297)         | 14.2 (426)        | 16.3 (489)        | 1.41                             |

Note: the total sea level rise for each epoch is in brackets

### Land use change

- 7.6.124 Land use change can affect the permeability of the ground, which can affect surface water run-off. Given that much of the land within the Study Area is currently used for agriculture, it is unlikely that the future run-off regime will change significantly within the Study Area. However, there may be further urban expansion within some of these areas which would result in an increase in surface water runoff. However, all development will be required to utilise SuDS to manage the rates and volumes of runoff to no greater than pre-development levels, and as such this is not expected to pose a significant change in runoff within the Study Area.

### WFD change

- 7.6.125 Given the current status of all the WFD surface water bodies within the Study Area is “Moderate” or “Poor”, and that all of the groundwater bodies are “Poor”, it is anticipated that in future their status will improve, ultimately to one of “Good” status/potential, as required by the WFD.
- 7.6.126 It may be appropriate to assess construction related effects against the existing baseline surface water environment, however potential operational effects should take account of a future baseline environment that assumes “Good” status/potential will be attained during the lifetime of the Project. This is because the WFD is still in effect and requires progression towards “Good” status/potential within that timeframe.

## 7.7 Embedded environmental measures

- 7.7.1 As part of the project design process, a number of embedded environmental measures are proposed to reduce the potential for impacts on the water environment, as summarised in **Table 7.15**. These are broken down into measures that are incorporated into the overall design of the Project, and those that are to be implemented during its construction and operational phases. Most of the embedded measures presented in **Table 7.15** are for the construction phase, as this is where most potential significant effects on the water environment are expected to occur. No measures have been specifically identified for the decommissioning phase of the Project. However, it is anticipated

that measures equivalent to those implemented during construction would also be effective in mitigating effects on the water environment during decommissioning.

- 7.7.2 These will evolve over the development process as the EIA progresses and where appropriate in response to consultation. They will be fed iteratively into the assessment process. These measures include those that would be considered as standard good practice in construction and include actions that would be undertaken to meet existing regulatory requirements.

**Table 7.15 Summary of embedded environmental measures**

| ID                    | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Compliance mechanism                 |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Overall design</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| <b>D-1</b>            | <b>Underground pipeline:</b> The pipeline will be completely buried underground (with the exception of HAGIs and BVs), and the ground will be suitably reinstated, so there will be minimal surface water and flood risk impacts once built, i.e. it will have no effect on surface runoff pathways and flood conveyance and/or storage in flood zone areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Final DCO design                     |
| <b>D-2</b>            | <b>Optimisation of routing:</b> the location of any permanent above ground infrastructure to avoid sensitive aquatic environments and flood risk areas, as far as possible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Final DCO design                     |
| <b>D-3</b>            | <b>Development of flood protection and drainage measures:</b> for permanent above ground infrastructure (HAGIs and Block Valves). Where necessary, flood protection requirements for HAGIs and Block Valves will be defined in the FRA as part of the final design for the DCO application. An Outline Drainage Strategy will also be developed for all HAGIs and Block Valves for the DCO application. The principles of flood protection and drainage design will meet the requirements of NPS-EN1 and NPPF, including taking into account climate change over the operational lifetime of the project. HAGI and Block Valve drainage systems will incorporate SuDS principles as far as possible. Detailed flood protection and drainage designs will be secured by DCO requirement and finalised post grant of the DCO. | Final DCO design and DCO requirement |
| <b>D-4</b>            | <b>Temporary access tracks design:</b> will be optimised to minimise impacts on drainage/soil conditions and will be specified based on ground conditions along the route. In specific areas (or during periods of adverse weather) there may be the requirement to import aggregates to create a stable surface for construction traffic movements. Options for access tracks include stripping the topsoil to                                                                                                                                                                                                                                                                                                                                                                                                             | CoCP secured via DCO requirement     |

| ID                                              | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Compliance mechanism               |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
|                                                 | allow vehicles to run on the subsoil, use of bog mats or overlaying crushed stone on a geotextile membrane to reduce impact. Detailed construction design will form part of the Code of Construction Practice (CoCP) (see measure <b>C-1</b> ), which will be secured via a DCO requirement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |
| <b>D-5</b>                                      | <b>Management of subsurface flow pathways:</b> All subsurface infrastructure will be designed to minimise disruption to existing subsurface flow pathways to avoid any localised increases in groundwater flooding risk. This could include the placing of water barriers/mitigation to prevent preferential flows in pipeline backfill where pipelines are aligned with subsurface flow directions, and the provision of cross-drainage above the pipeline where they are aligned transverse to subsurface flow directions. On this latter point, in many cases, this may simply require reinstatement of existing agricultural drainage following completion of construction (see measure <b>C-4</b> below). Detailed pipeline backfill design will be secured by DCO requirement and finalised post grant of the DCO.                                                                      | Final DCO design, DCO requirement. |
| <b>Construction - general</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                    |
| <b>C-1</b>                                      | <b>A Code of Construction Practice (CoCP)</b> would be produced prior to commencement of construction, which would detail measures to be implemented (via a Construction Environmental Management Plan, CEMP) to minimise disturbance and/or pollution to the water environment and will provide details of measures to protect environmental receptors. All aspects of the construction work will be in accordance with the Construction (Design and Management) Regulations 2015. In addition, work will be done in accordance with advice notes, guidance documents and Environment Agency Pollution Prevention Guidelines (PPGs). An outline CoCP will be developed to accompany the DCO application. However, the final CoCP will be developed by the construction contractor post granting of the DCO and prior to commencement of works and will be secured through a DCO requirement. | DCO requirement                    |
| <b>Construction - water and silt management</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                    |
| <b>C-2</b>                                      | <b>A Drainage and Water Management Plan (DWMP):</b> for all construction activities will be developed to support the CoCP, incorporating the embedded mitigation given below. The DWMP will incorporate SuDS principles and specify appropriate treatment and attenuation storage to ensure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CoCP and DCO requirement           |

| ID  | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Compliance mechanism |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|     | any discharges to watercourses are uncontaminated and limited to greenfield rates. This will set out surface water drainage measures for the pipeline swathe and associated haul road networks, construction compounds, laydown areas and HAGI/ block valve construction sites. It will also specify measures for the treatment and discharge of dewatered groundwater. The DWMP will be developed by the construction contractor post granting of the DCO and prior to commencement of works and will be secured through a DCO requirement.                          |                      |
| C-3 | <b>Timing of works:</b> Pipeline construction is generally focused on the spring and summer months (March to September) with the aim to reduce impacts on agricultural land. The works at crossings and on pipelines in the public highway may occur outside the typical pipelaying season and throughout the year.                                                                                                                                                                                                                                                   | CoCP and DWMP        |
| C-4 | <b>Diversion and reinstatement of existing drainage networks:</b> To minimise impacts on surrounding agricultural land particular care will be taken to ensure that the existing land drainage regime is not compromised as a result of construction. Existing land drainage systems will be maintained and diverted as necessary during construction and reinstated on completion.                                                                                                                                                                                   | CoCP and DWMP        |
| C-5 | <b>Private abstraction risk assessment and mitigation strategy:</b> A detailed survey of private abstractions will be carried out prior to construction to avoid abstractions wherever possible. Through risk assessment, where temporary loss of supply cannot be ruled out, alternative provision will be made, followed by full reinstatement on completion of the works.                                                                                                                                                                                          | CoCP and DWMP        |
| C-6 | <b>Temporary provision of surface water drainage for construction areas:</b> including the pipeline swathe, haul roads, construction compounds, laydown areas and HAGI/ Block Valve construction sites, in line with the requirements of the DWMP. Construction drainage could include interceptor drains to ensure clean runoff from upslope areas is diverted away from working areas. Interceptor drains will provide appropriate water treatment and infiltration to ground or attenuation to greenfield rates, prior to discharge for runoff from working areas. | CoCP and DWMP        |
| C-7 | <b>Management of dewatering of excavations:</b> Dewatering of trench excavations will be carefully monitored and                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CoCP and DWMP        |

| ID          | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Compliance mechanism |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|             | <p>groundwater flow disruption and drawdown will be minimised as much as possible by keeping excavation depths and abstraction rates to an operational minimum. Temporary cut-off drains will be installed to minimise surface water and shallow groundwater ingress into the pipeline trench and other excavations, such as HDD drive and reception pits (should HDD be used) and excavations at HAGI/Block Valve construction sites. Appropriate treatment for dewatered groundwater will be installed before discharge to surface or land (as detailed below in measure <b>C-18</b>).</p>                                                                                                                                                                                                                                             |                      |
| <b>C-8</b>  | <p><b>Silt management measures:</b> will be used to minimise the concentration of fine sediment in runoff from working areas and dewatered groundwater from excavations. These measures could include: retaining as much vegetation as possible, seeding or sheeting of soil stockpiles where these are present for extended periods, discharge for infiltration to vegetated areas, and the incorporation of silt fences, straw bales, settlement ponds or siltbuster-type devices into drainage systems prior to discharge to watercourses.</p>                                                                                                                                                                                                                                                                                        | CoCP and DWMP        |
| <b>C-9</b>  | <p><b>Stand-off distances from watercourses, flood defences and water supply and sewage infrastructure:</b> To minimise the potential for impacts to watercourses, a stand-off distance from all watercourses/water bodies will be established (with the exception of crossings and where existing field access roads are already located adjacent to watercourses are to be utilised). We propose that this be 8m for non-tidal watercourses and 16m for tidal watercourses, in order to align with Environment Agency FRAP requirements for main rivers. These stand-offs will also apply to flood defences.</p> <p>Appropriate stand-off distances should also be applied where there is interaction between Project construction activities and water supply and sewerage infrastructure (to be agreed on a case-by-case basis).</p> | CoCP and DWMP        |
| <b>C-10</b> | <p><b>Timely reinstatement following completion of works:</b> working areas will be reinstated to their pre-construction condition as soon as possible following completion of construction. If the risk of sediment mobilisation remains, any necessary drainage and silt management measures would remain in place until vegetation becomes re-established.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CoCP                 |

| ID                                         | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Compliance mechanism |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| C-11                                       | <b>Permitting of discharges:</b> Discharges from construction activities will be subject to obtaining relevant discharge permits from the Environment Agency. A Monitoring Plan will be developed to ensure that the discharged water meets permit conditions (see measure <b>C-19</b> below)                                                                                                                                                                                                                                                                                                                                                                                              | Environmental Permit |
| C-12                                       | <b>Discharge outfall design:</b> temporary construction outfalls will be suitably designed to minimise impacts on scour and erosion in the receiving watercourse and will be subject to FRAP for main rivers and OWC for ordinary watercourses.                                                                                                                                                                                                                                                                                                                                                                                                                                            | FRAP/OWC             |
| <b>Construction - pollution prevention</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |
| C-13                                       | <b>A Pollution Prevention Plan (PPP)</b> will be developed to support the CoCP, which will detail how ground and surface waters will be protected during construction. These will include information on the storage of any fuels, oils and other chemicals and pollution incidence response planning. These will also include measures for the protection of licenced and private abstractions and could include a monitoring regime associated with critical or very proximate receptors (see measure <b>C-19</b> ). The PPP will be developed by the construction contractor post granting of the DCO and prior to commencement of works and will be secured through a DCO requirement. | CoCP and PPP         |
| C-14                                       | <b>Storage of hydrocarbons and other chemicals:</b> Fuel storage will be in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001 and other Pollution Prevention Guidelines (PPGs). Areas at risk of spillage will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or local watercourses. All stores of fuel will be located at least 20m from any watercourses and away from areas at risk of flooding. Any tanks and associated pipe work containing oils, fuels and chemicals will be double skinned. . They will have a bunded capacity appropriate for hazardous fluids.                          | CoCP and PPP         |
| C-15                                       | <b>Refuelling, inspection and maintenance:</b> Refuelling of machinery will be undertaken within a designated area where spillages can be easily contained and provided with hydrocarbon separator. Areas of construction compounds that are used for fuel storage, plant maintenance and refuelling will be surfaced with fully impermeable materials to prevent any infiltration of contaminated runoff and contain bunding.                                                                                                                                                                                                                                                             | CoCP and PPP         |

| ID   | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Compliance mechanism               |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
|      | Plant and machinery used during the construction and operation phases will be maintained to minimise the risks of oils leaks or similar. Placing a drip tray beneath a plant and machinery during refuelling and the availability of spill kits will contain small spillages.                                                                                                                                                                                                                                                                                                   |                                    |
| C-16 | <b>Handling and processing of concrete:</b> Measures will be in place to control, store (and treat) concrete wash water and waste arising from the process on site. Concrete wash out areas on site should be sited away from any watercourses or drainage channels to prevent accidental escapes of liquid or slurries to the water environment. Lining of these areas may also be undertaken.                                                                                                                                                                                 | CoCP and PPP                       |
| C-17 | <b>Measures to avoid pollution impacts from disturbance of contaminated land (Materials Management Plan, MMP):</b> Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate/runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. Such materials will only be reused if they are confirmed as suitable for use in line with the requirements of the MMP. | CoCP, PPP and MMP                  |
| C-18 | <b>Treatment and discharge of contaminated groundwater:</b> If water being pumped from excavations is suspected to be contaminated, appropriate storage, testing and disposal will be taken in accordance with Environment Agency guidance and the Environmental Permitting Regulations to prevent uncontrolled or unauthorised releases of this water to ground or to the water environment. Contaminated groundwater will only be discharged following appropriate treatment, subject to an Environmental Permit.                                                             | CoCP, PPP and Environmental Permit |
| C-19 | <b>A monitoring and inspection programme:</b> will be developed to ensure that the requirements of the PPP and Environmental Permits for discharge are being met during construction.                                                                                                                                                                                                                                                                                                                                                                                           | CoCP, PPP and Environmental Permit |
| C-20 | <b>Foul drainage from temporary compounds:</b> appropriate treatment and disposal of sewage will be provided where no foul sewer is available to ensure protection of the water environment. Should discharge of treated effluent to                                                                                                                                                                                                                                                                                                                                            | Environmental Permit, if required. |

| ID                               | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Compliance mechanism                         |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
|                                  | watercourses or to land be required, this would be subject to an Environmental Permit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                              |
| C-21                             | <b>Pre-commissioning pipeline testing:</b> Pre-commissioning pipeline testing will be subject to granting of requisite abstraction licences and discharge permits, subject to quantity and quality limits agreed with the Environment Agency during the license/permit application process. Sufficient storage and treatment will be provided to ensure licence permit conditions are met.                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Abstraction Licence and Environmental Permit |
| <b>Construction - flood risk</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |
| C-22                             | <b>Preferential siting:</b> of construction infrastructure and activities to minimise flood risk and impacts on sensitive receptors as far as possible. Any works in areas of significant flood risk will only be undertaken in line with the NPPF exception and sequential tests and subject to full FRA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FRA and CoCP                                 |
| C-23                             | <b>A Flood Emergency Response Plan (FERP):</b> will be prepared for those construction activities which must take place in areas of higher flood risk. This will describe the flood hazard, assess the risk to infrastructure and personnel, specify roles and responsibilities, arrangements for receiving flood warnings, responses to flood warnings (including evacuation as required), and evacuation routes. In addition, the FERP will set out arrangements for cessation of excavation dewatering activities, should a flood alert or flood warning be received, to minimise any impacts on flood flow conveyance and to maintain access for watercourse maintenance. The FERP will be developed by the construction contractor post granting of the DCO and prior to commencement of works and will be secured through a DCO requirement. | FERP and CoCP                                |
| C-24                             | <b>Minimise raised structures in floodplains:</b> Where potential flood risk receptors could be impacted by a loss of floodplain storage and/or impacts on floodplain conveyance, soil stockpiles (associated with both the pipeline construction and the temporary haul road) will be located outside of the fluvial floodplain wherever possible. Soil stockpile impacts in the floodplain, where unavoidable, will be mitigated through appropriate alignment, leaving gaps and cross-drainage. Haul road levels will be kept as close to existing ground levels as possible. Where haul                                                                                                                                                                                                                                                        | FRA and CoCP                                 |

| ID                                          | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Compliance mechanism       |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
|                                             | roads must be raised, cross-drainage will be provided as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |
| <b>Construction - watercourse crossings</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                            |
| <b>C-25</b>                                 | <b>A Watercourse Crossing Plan (WCP):</b> will be developed to support the CoCP, setting out detailed design proposals for all watercourse crossings (temporary access and permanent pipeline), detailed construction methods, mitigation requirements for installation, operation and, if required, removal and permitting requirements. The WCP will be developed by the construction contractor post granting of the DCO and prior to commencement of works and will be secured through a DCO requirement.                                                                                                                                                                                                                                                                                                                        | CoCP and WCP               |
| <b>C-26</b>                                 | <b>Trenchless pipeline crossings:</b> All pipeline crossings of major watercourses are to be trenchless. Drive and reception pits or shafts for HDD and other trenchless technologies will be micro-sited outside of the floodplain where possible. All permanent pipeline crossings will pass beneath the bed of watercourses. Sufficient depth between the bed of the watercourse and the top of the pipeline will be provided to ensure no potential for exposure of pipeline due to scour. Where the pipeline route crosses an Environment Agency flood defence, trenchless methodologies will be used. All necessary permits (FRAP or OWC) will be obtained prior to commencement. Sensitive aquifers, identified from desk study and ground investigation works, will be considered in the design of the trenchless crossings. | CoCP, WCP, FRAP and/or OWC |
| <b>C-27</b>                                 | <b>Trenched crossings of minor watercourses:</b> Mitigation measures will be implemented to minimise impacts on flows, morphology, water quality and aquatic habitat. Working areas will be isolated and flows maintained by fluming or overpumping. At sensitive crossing locations the working width will be reduced as far as practicable. Works will be brief, typically being completed in the short term. Banks and bed will be fully reinstated prior to flows being restored in the channel. The timing of in-channel works will be programmed to avoid seasonal fish spawning/migration periods for watercourses where this is identified as an issue. All necessary permits (FRAP or OWC) will be obtained prior to commencement.                                                                                          | CoCP, WCP, FRAP and/or OWC |

| ID                       | Embedded measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Compliance mechanism       |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>C-28</b>              | <b>Temporary construction access watercourse crossings:</b> Minor watercourses (where open cut techniques are proposed for the permanent pipeline crossings) will also typically have temporary crossings for the haul road to provide vehicular access along the route. Clear span bridges would be provided for larger or more sensitive watercourses to avoid impacts on channel morphology and aquatic habitat. Any temporary crossings will be in place for the minimal time possible. The mitigation measures set out above under <b>C-27</b> would be employed during crossing installation and removal. All necessary permits (FRAP or OWC) will be obtained prior to commencement. | CoCP, WCP, FRAP and/or OWC |
| <b>Operational phase</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            |
| <b>O-1</b>               | <b>Periodic inspection and maintenance of flood protection and drainage measures:</b> will be carried out at HAGIs and Block Valves areas to ensure they continue to operate effectively over the operational lifetime of the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DCO requirement            |

## 7.8 Scope of the Assessment

- 7.8.1 The scope of the assessment for the water environment for the PEIR is consistent with that provided in the Scoping Report, and no major changes have been made since the scoping phase. However, it does take account of the comments received in the Scoping Opinion and ongoing stakeholder engagement (**Section 7.3**).

### Potential receptors

- 7.8.2 The baseline characterisation identifies potential water environment receptors (**Figure 7.9**) within the following three broad receptor types:
- aquatic environment;
  - water resources; and
  - flood risk.
- 7.8.3 Each of these receptor types are discussed in this section below.

### Aquatic environment receptors

- 7.8.4 Aquatic environment receptors are defined within this assessment as either WFD surface and groundwater water bodies or water-dependent designated nature conservation sites. The basic unit for identification of aquatic environment

receptors is WFD surface and groundwater water bodies, as defined in the EA's Cycle 2 RBMPs. Groundwater WFD water bodies have been considered under these receptors due to their potential to feed aquatic environment receptors.

- 7.8.5 The assessment considers the potential effects on the surface water quality and hydromorphology supporting elements of WFD ecological status. The biological elements of ecological status for river water bodies (macroinvertebrates and fish) are not part of future water environment assessments within the EIA. However, the potential for indirect effects on biology elements, which could occur as a direct result of changes to the water quality or the hydromorphology of a water feature are identified within this chapter. Although closely linked, any deterioration of water quality and impacts upon achieving "Good" ecological status in estuaries and rivers are to be addressed within **Section 7.10** of this chapter, whilst potential direct effects on macroinvertebrates and fish populations and other water dependent protected species are addressed under **Chapter 5: Biodiversity**.
- 7.8.6 For groundwater WFD bodies, "Good" status has quantitative and chemical components that are assessed via a series of 'tests' (**Appendix C - Graphic 1-1**). Quantitative status is evaluated on the basis of overall aquifer water balance, impacts of abstraction on dependent surface waters or wetlands and potential for saline intrusion. Chemical status is evaluated on the basis of evidence for impacts of poor water quality on dependent surface waters or wetlands or deterioration of the quality of groundwater used for potable supply. These together provide a single final classification: "Good" or "Poor" status.
- 7.8.7 WFD chemical status is also considered as part of the assessment of effects on the water environment. Whilst it is unlikely that the Project would result in new emissions of priority substances or priority hazardous substances into the environment, it is possible that construction works could lead to the disturbance of existing sources of pollution. If required, the assessment of potential effects from such impacts would be reported within the **Chapter 12: Ground Conditions**.
- 7.8.8 WFD monitoring and classification data are typically derived from the principal watercourses within the catchment (the so-called 'blue line' watercourses). It should be noted however that within the assessment all watercourses within WFD catchments have been considered to ensure that any potential effects are captured and managed to an acceptable level for all catchment receptors.
- 7.8.9 This chapter is supported by a standalone WFD compliance assessment (**Appendix 7C**), which considers impacts of the Project on compliance for both surface and ground water bodies, plus the water bodies overall status.
- 7.8.10 The potential for impacts on the supporting water quality and hydromorphology for freshwater dependent sites is also considered. This includes all sites that are internationally and nationally designated for nature conservation purposes (i.e. SAC, SPA, Ramsar sites, SSSI and NNR); and local nature conservation designations (i.e. LNR and Local Wildlife Sites). In this context, the potential water dependence, and consequent impacts on water quality and hydromorphology arising from the Project are considered in respect of the condition and conservation objectives of each designated site.

- 7.8.11 All conservation sites outside of the Zol, or those within which have been deemed to not have a hydrological or hydrogeological component to their designation, have been screened out from further assessment here. They are however listed in **Chapter 5: Biodiversity. Table 2-6 of Appendix 7A**, which contains the results and rationale of conservation site screening and has been judged to be unlikely to be affected by the Project. The locations of the screened in conservation sites are shown in **Figure 7.2**.

### *Water resources receptors*

- 7.8.12 Water resources receptors are defined as surface water and groundwater abstractions including their associated catchment areas. The potential for impacts on water quality, and water balance and flow regime in the catchments upstream of abstraction locations are assessed to determine potential effects on the abstractions themselves. The assessment of abstractions considers both those from surface water and groundwater sources. Any groundwater level and water quality impacts on WFD ground water bodies are assessed within the **Appendix 7C**.
- 7.8.13 Discharges to surface water are also considered, although there is little scope for effects of the Project during construction on discharges, apart from direct physical impingement, which should be largely avoided through the imposition of suitable stand-off distances between working areas and discharge infrastructure.

### *Flood risk receptors*

- 7.8.14 Flood risk receptors are defined as property and infrastructure that could be at risk of flooding. Their sensitivity is defined in terms of the flood risk vulnerability classification set out in Table 2 of the Planning Practice Guidance on Flood Risk and Coastal Change<sup>123</sup> that supports the NPPF. It is recognised that the primary purpose of the NPPF flood vulnerability classification is to guide flood risk assessment requirements for new development, but it is also considered to be a useful guide to assessing the relative sensitivity of external receptors for flood risk effects from new development. Further detail regarding the identification of flood risk receptors is set out in the preliminary FRA (**Appendix 7B**).
- 7.8.15 The water environment receptors that have been identified as being potentially subject to effects are summarised in **Table 7.16**. No PWS have been identified within the Study Area (see **Section 7.6**).

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<sup>123</sup> UK Government: Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2021). Guidance: Flood risk and coastal change (online). Available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change> (Accessed 22 November 2021).

Table 7.16 Water environment receptors subject to potential effects

| Receptor                                                                                   | Reason for inclusion                                                                                          | Receptor Sensitivity*                                               |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Aquatic environment receptors                                                              |                                                                                                               |                                                                     |
| WFD Groundwater bodies                                                                     |                                                                                                               |                                                                     |
| Wirral and West Cheshire Permo-Triassic Sandstone Aquifers (GB41101G202600)                | WFD groundwater bodies which are intersected by the Preliminary Order Limits                                  | All at current WFD status “Poor” (Medium Sensitivity)               |
| Weaver and Dane Quaternary Sand and Gravel Aquifers (GB41202G991700)                       |                                                                                                               |                                                                     |
| Manchester and East Cheshire Permo-Triassic Sandstone Aquifers (GB41201G101100)            |                                                                                                               |                                                                     |
| Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers (GB41201G101700) |                                                                                                               |                                                                     |
| Sankey and Glaze Carboniferous Aquifers (GB41202G100100)                                   |                                                                                                               |                                                                     |
| WFD Surface Water Bodies                                                                   |                                                                                                               |                                                                     |
| Sinderland Brook (GB 112069060980)                                                         | WFD surface water bodies (river) which are intersected by, and are downstream of the Preliminary Order Limits | All at current WFD status “Moderate” to “Poor” (Medium Sensitivity) |
| Whittle Brook (Mersey Estuary) (GB112069060990)                                            |                                                                                                               |                                                                     |
| Sutton Brook (GB112069061170)                                                              |                                                                                                               |                                                                     |
| Weaver (Dane to Frodsham) (GB 112068060500)                                                |                                                                                                               |                                                                     |

| Receptor                                                                                | Reason for inclusion | Receptor Sensitivity* |
|-----------------------------------------------------------------------------------------|----------------------|-----------------------|
| Mersey/ Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin) (GB112069061011) |                      |                       |
| Weaver (Marbury Brook to Dane)                                                          |                      |                       |
| Bollin (Ashley Mill to Manchester Ship Canal) (GB112069061382)                          |                      |                       |
| Dane (Wheelock to Weaver) (GBGB112068060470)                                            |                      |                       |
| Gale Brook (GB112068060430)                                                             |                      |                       |
| Puddinglake Brook (GB112068060220)                                                      |                      |                       |
| Bogart Brook (GB112068060540)                                                           |                      |                       |
| Cuddington Brook (GB112068060480)                                                       |                      |                       |
| Wade Brook (GB112068060370)                                                             |                      |                       |
| Peckmill Brook, Hoolpool Gutter at Ince Marshes water body (GB112068060330)             |                      |                       |
| Arley Brook (Source to Gale Brook) (GB112068060420)                                     |                      |                       |
| Keckwick Brook (GB112068060520)                                                         |                      |                       |
| Cogshall Brook (GB112068060510)                                                         |                      |                       |
| Mersey (Bollin confluence to Howley Weir) including Padgate Brook (GB112069061012)      |                      |                       |

| Receptor                                                                      | Reason for inclusion                                                                                              | Receptor Sensitivity*                                                                                                                                                                    |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sankey Brook (Hardshaw Brook to Rainford Brook) (GB112069061180)              |                                                                                                                   |                                                                                                                                                                                          |
| Hardshaw (Windle) Brook (GB112069061210)                                      |                                                                                                                   |                                                                                                                                                                                          |
| <b>WFD Canal Water Bodies</b>                                                 | WFD surface water bodies (canal) which are intersected by, and are downstream of the Preliminary Order Limits     | All at current WFD “Moderate” status (Medium Sensitivity)                                                                                                                                |
| Weaver Navigation (canal section Frodsham to Weston Point Docks) (GB71210545) |                                                                                                                   |                                                                                                                                                                                          |
| Bridgewater Canal (GB71210001)                                                |                                                                                                                   |                                                                                                                                                                                          |
| Manchester Ship Canal (GB71210004)                                            |                                                                                                                   |                                                                                                                                                                                          |
| Sankey Canal (GB71210055)                                                     |                                                                                                                   |                                                                                                                                                                                          |
| Trent and Mersey Canal, summit to Preston Brook Tunnel (GB71210247)           |                                                                                                                   |                                                                                                                                                                                          |
| <b>WFD Transitional Water Body</b>                                            | WFD surface water body (transitional) which is intersected by, and are downstream of the Preliminary Order Limits | Current WFD “Moderate” status, although it supports Natura 2000 Protected Areas, the scale of the receptor means its sensitivity to effects is likely to be limited (Medium Sensitivity) |
| Mersey (GB531206908100)                                                       |                                                                                                                   |                                                                                                                                                                                          |
| <b>Conservation Sites</b>                                                     | These sites, occurring within the Zol of the                                                                      | Mersey Estuary at High Sensitivity based on                                                                                                                                              |

| Receptor                                          | Reason for inclusion                                                          | Receptor Sensitivity*                                                                                                                                                                 |
|---------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C2</b> Woolston Eyes (SSSI)                    | Project, are Designated Conservation Sites and identified as water dependent. | Ramsar/ SPA designation                                                                                                                                                               |
| <b>C3</b> Mersey Estuary (SSSI, Ramsar, SPA, LWS) |                                                                               |                                                                                                                                                                                       |
| <b>C6</b> Thatto Heath Meadows (LNR, LWS)         |                                                                               | All other conservation sites at Medium (e.g. SSSI and NNR) to Low (e.g. LNRs, County Wildlife Sites and Sites of Importance for Nature Conservation) Sensitivity based on designation |
| <b>C9</b> Marshall's Arm, Hartford (LNR)          |                                                                               |                                                                                                                                                                                       |
| <b>C13</b> Old mineral line Lea Green (LWS)       |                                                                               |                                                                                                                                                                                       |
| <b>C14</b> Pendlebury Brook (LWS)                 |                                                                               |                                                                                                                                                                                       |
| <b>C15</b> Whittle Brook (LWS)                    |                                                                               |                                                                                                                                                                                       |
| <b>C16</b> Ansdells Wood (LWS)                    |                                                                               |                                                                                                                                                                                       |
| <b>C17</b> Ravenhead Ponds (LWS)                  |                                                                               |                                                                                                                                                                                       |
| <b>C22</b> Sutton Manor (LWS)                     |                                                                               |                                                                                                                                                                                       |
| <b>C23</b> Sinderland Green (LWS)                 |                                                                               |                                                                                                                                                                                       |
| <b>C24</b> Partington Nature Reserve (LWS)        |                                                                               |                                                                                                                                                                                       |
| <b>C25</b> Dunham Massey (LWS)                    |                                                                               |                                                                                                                                                                                       |
| <b>C27</b> Moore Nature Reserve (LWS)             |                                                                               |                                                                                                                                                                                       |
| <b>C28</b> Moss Side Farm (LWS)                   |                                                                               |                                                                                                                                                                                       |

| Receptor                                                                                     | Reason for inclusion                                                                                                                                                           | Receptor Sensitivity*                                                                                               |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>C29</b> Morton Marsh and Upper Moss Side Fields (LWS)                                     |                                                                                                                                                                                |                                                                                                                     |
| <b>C30</b> Gatewarth Landfill Site (LWS)                                                     |                                                                                                                                                                                |                                                                                                                     |
| <b>C32</b> Rows Wood (LWS)                                                                   |                                                                                                                                                                                |                                                                                                                     |
| <b>C34</b> St Helens Canal (West) (LWS)                                                      |                                                                                                                                                                                |                                                                                                                     |
| <b>C35</b> Pitts Heath Wood (LWS)                                                            |                                                                                                                                                                                |                                                                                                                     |
| <b>C36</b> Flood Brook Clough (LWS)                                                          |                                                                                                                                                                                |                                                                                                                     |
| <b>C37</b> Mort's Wood (LWS)                                                                 |                                                                                                                                                                                |                                                                                                                     |
| <b>C38</b> Halton Moss (LWS)                                                                 |                                                                                                                                                                                |                                                                                                                     |
| <b>Water Resources</b>                                                                       |                                                                                                                                                                                |                                                                                                                     |
| <b>Licensed groundwater abstractions</b>                                                     |                                                                                                                                                                                |                                                                                                                     |
| <b>A1</b> 2569017028, Borehole at Peterhouse Farm, Gorsey Lane, Warburton                    | Licensed groundwater abstractions within the Study Area whose associated catchment areas (assumed groundwater catchment radius limit of 1.5km) which have a possible hydraulic | Low Sensitivity based on abstraction purpose and scale (i.e non-public water supply/ industrial/ agricultural use). |
| <b>A2, A3</b> 2569017026, Borehole at Broad Oak Farm, Warburton, Lymm                        |                                                                                                                                                                                |                                                                                                                     |
| <b>A4, A5, A6, A7</b> 2569024013, Boreholes X 6 at Warrington and Penketh Cheshire - Well 12 |                                                                                                                                                                                |                                                                                                                     |
| <b>A8</b> NW/069/0024/005, Ao Plant Wells                                                    |                                                                                                                                                                                |                                                                                                                     |

| Receptor                                                                                                                | Reason for inclusion                       | Receptor Sensitivity* |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| <b>A9, A10, A11, A12, A13</b> 2569024013, Boreholes X 6 At Warrington and Penketh Cheshire- Well 11                     | pathway from the Preliminary Order Limits. |                       |
| <b>A14</b> NW/069/0025/001/R01, Warrington Wolves borehole                                                              |                                            |                       |
| <b>A15, A16</b> 2569021019, Excav. Into U/G Strata at Caddick's Clematis Nursery, Lymm                                  |                                            |                       |
| <b>A19</b> 2568003040, Collecting Tank at Bridge Farm, Anderton, Northwich, Cheshire                                    |                                            |                       |
| <b>A20</b> 2568003055, Well at Manor Farm, Anderton, Northwich, Cheshire                                                |                                            |                       |
| <b>A25, A26, A27, A28</b> 2569024013, Boreholes X 6 at Warrington and Penketh Cheshire - Well 2                         |                                            |                       |
| <b>A29, A30, A31</b> 2569024013, Boreholes X 6 at Warrington and Penketh Cheshire - Well 1                              |                                            |                       |
| <b>A32, A33</b> 2569024013, Boreholes X 6 at Warrington and Penketh Cheshire - Well 5                                   |                                            |                       |
| <b>A34, A35, A36, A37, A38, A39, A40, A41, A42, A43</b> 2569024024, 5 Boreholes at Fiddlers Ferry Power Station, Widnes |                                            |                       |
| <b>A48</b> 2568003039, Well at Aston Grange, Preston Brook                                                              |                                            |                       |
| <b>A49</b> 2568003088, Borehole at Premises at Rocksavage Works, Runcorn                                                |                                            |                       |

| Receptor                                                                                                           | Reason for inclusion                                                                                                                                             | Receptor Sensitivity*                                                                                 |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>A50</b> NW/068/0004/001, Borehole 2                                                                             |                                                                                                                                                                  |                                                                                                       |
| <b>A51, A52, A53, A54, A55, A56</b> 2569024013, Boreholes X 6 At Warrington and Penketh Cheshire - Well 6          |                                                                                                                                                                  |                                                                                                       |
| <b>A57, A58, A59, A60, A61, A62</b> NW/068/0006/012, Borehole No 7 at Thornton-Le-Moors & Stanlow, Ellesmere Port  |                                                                                                                                                                  |                                                                                                       |
| <b>A63</b> 2568004012 Borehole at Weston Point, Runcorn                                                            |                                                                                                                                                                  |                                                                                                       |
| <b>A66</b> 2568003052, Well at Dairy Farm, High Legh, Knutsford                                                    |                                                                                                                                                                  |                                                                                                       |
| <b>A87</b> 2568005002, Borehole at Mersey Bank Farm, Hapsford, Helsby                                              |                                                                                                                                                                  |                                                                                                       |
| <b>A89, A90, A91, A92, A93, A94</b> NW/068/0006/011, Boreholes (22) at Thornton-Le-Moors & Stanlow, Ellesmere Port |                                                                                                                                                                  |                                                                                                       |
| <b>Licensed Public Groundwater Abstractions</b>                                                                    | Licensed public groundwater abstractions whose associated catchment areas which are intersected by, and down hydraulic gradient of the Preliminary Order Limits. | Medium Sensitivity based abstraction purpose and scale (i.e. locally important public water supplies) |
| <b>A107</b> 2568004008, Boreholes (2) At Hough Lane, Walton, Warrington                                            |                                                                                                                                                                  |                                                                                                       |
| <b>A109</b> 2568004016, Borehole at Daresbury, near Warrington                                                     |                                                                                                                                                                  |                                                                                                       |
| <b>A112</b> 2569025037, Borehole (1) & Wells (2), Eccleston Hill, St.Helens                                        |                                                                                                                                                                  |                                                                                                       |
| <b>A113</b> Bold Heath Borehole - non-operational borehole                                                         |                                                                                                                                                                  |                                                                                                       |
| <b>A114</b> Broomedge Borehole - non-operational borehole                                                          |                                                                                                                                                                  |                                                                                                       |

| Receptor                                                                                   | Reason for inclusion                                                                                                           | Receptor Sensitivity*                                                                                                |
|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Licensed surface water abstractions</b>                                                 | Surface water abstractions whose associated catchment areas are intersected by, or downstream of the Preliminary Order Limits. | Low Sensitivity based on abstraction purpose and scale (i.e. non-public water supply/ industrial/ agricultural use). |
| <b>A116</b> 2569020060, Bridgewater Canal at Agden, Lymm                                   |                                                                                                                                |                                                                                                                      |
| <b>A117</b> 2569020063, River Bollin at Agden, Lymm, Cheshire                              |                                                                                                                                |                                                                                                                      |
| <b>A118</b> 2569020041, River Bollin at Heatley, Altrincham, Cheshire                      |                                                                                                                                |                                                                                                                      |
| <b>A120</b> 2569017033, Caldwell Brook at Sinderland Green, Dunham Massey, Altrincham      |                                                                                                                                |                                                                                                                      |
| <b>A121</b> 2569017030, Sinderland Brook at Warburton, Lymm, and Dunham Massey, Altrincham |                                                                                                                                |                                                                                                                      |
| <b>A122</b> 2569017031, Sinderland Brook at Sinderland Green Dunham Massey, Altrincham     |                                                                                                                                |                                                                                                                      |
| <b>A123</b> 2569020067, Bridgewater Canal at Agden                                         |                                                                                                                                |                                                                                                                      |
| <b>A125</b> 2568001028, Rookery Pool at Vale Royal Abbey, Whitegate                        |                                                                                                                                |                                                                                                                      |
| <b>A126</b> 2568001206, Pettypool Brook at Whitegate, Winsford, Cheshire                   |                                                                                                                                |                                                                                                                      |
| <b>A127</b> 2568001173, River Weaver at LhHS Premises, Winsford, Cheshire                  |                                                                                                                                |                                                                                                                      |
| <b>A128</b> 2569020059, River Bollin at Warburton, Lymm                                    |                                                                                                                                |                                                                                                                      |
| <b>A129</b> 2569020010, River Bollin at Warburton, Lymm, Cheshire                          |                                                                                                                                |                                                                                                                      |

| Receptor                                                                                               | Reason for inclusion | Receptor Sensitivity* |
|--------------------------------------------------------------------------------------------------------|----------------------|-----------------------|
| <b>A130</b> 2568001018, Petty Pool, Sandiway Fed by and O/F to unnamed Tributaries ff the River Weaver |                      |                       |
| <b>A132</b> NW/068/0003/003, Cliff Brook at Acton Bridge, Northwich, Cheshire                          |                      |                       |
| <b>A133</b> 2568003120, Acton Brook at Weaverham, Northwich                                            |                      |                       |
| <b>A134, A135</b> 2568003082, River Weaver at Premises, Winnington, Northwich                          |                      |                       |
| <b>A136</b> NW/068/0003/014, River Weaver Navigation at Saltersford Lock                               |                      |                       |
| <b>A137</b> NW/068/0003/009, Anderton Boat Lift                                                        |                      |                       |
| <b>A139</b> 2568003097, Whitley Brook at Heath Hall Farm, Little Leigh                                 |                      |                       |
| <b>A140</b> NW/068/0003/011, Hydropower Intake - Dutton Sluices                                        |                      |                       |
| <b>A141</b> 2568003097, Whitley Brook at Heath Hall Farm, Little Leigh                                 |                      |                       |
| <b>A143, A144</b> 2568004026, Unnamed Watercourse feeding f pond at Daresbury Farm,                    |                      |                       |
| <b>A146</b> 2569024005, River Mersey at Bank Quay, Warrington                                          |                      |                       |
| <b>A148</b> 2568003109, Weston Canal (Weaver Navigation) at Pumping Station, Frodsham                  |                      |                       |
| <b>A149</b> 2568003095, Weston Canal at Sutton, Runcorn [ICI] [Sutton Causeway/West Cl]                |                      |                       |

| Receptor                                                                                                                 | Reason for inclusion                               | Receptor Sensitivity*                                  |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------|
| <b>A150, A151</b> 2568004997, Weston Canal at Weston Point Runcorn Cheshire                                              |                                                    |                                                        |
| <b>A152, A153</b> 2568009008, Manchester Ship Canal at Weston Point, Runcorn                                             |                                                    |                                                        |
| <b>A156</b> 2569017032, Red Brook at Warburton, Lymm, Cheshire                                                           |                                                    |                                                        |
| <b>A157, A161, A162</b> 2568009001, Manchester Ship Canal at Ellesmere Port                                              |                                                    |                                                        |
| <b>A158, A159</b> 2568009017, Manchester Ship Canal at Ellesmere Port                                                    |                                                    |                                                        |
| <b>A160</b> NW/068/0006/016, Inland Water - Thornton Brook at Stanlow Manufacturing                                      |                                                    |                                                        |
| <b>A163</b> NW/069/0007/002, Manchester Ship Canal, Partington, Carrington, Manchester                                   |                                                    |                                                        |
| <b>Consented Discharges</b>                                                                                              | All discharges within the preliminary Order Limits | Low Sensitivity based on scale of permitted discharges |
| <b>D1</b> Vale Royal Abbey, Vale Royal Abbey, Whitegate, Cheshire (016891950) at SJ 63930 70220 (Sewage Treatment Works) |                                                    |                                                        |
| <b>D2</b> East Clifton Marsh Northern outfall, Frodsham, Cheshire (016890503) at SJ 52690 79040                          |                                                    |                                                        |
| <b>D3/ D4</b> Encirc, Ash Road, Elton, Cheshire (016892435) at SJ 46207 76302                                            |                                                    |                                                        |

\* Note that Receptor Sensitivity has been determined from **Table 7.19: Definitions of receptor sensitivity**.

## Likely significant effects

7.8.16 The effects on the water environment receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 7.17**. Construction phase effects would be temporary in nature for the duration of the works. Operational phase effects would persist throughout this phase, until such time as permanent project infrastructure is decommissioned. Decommissioning phase effects are likely to be similar to those for the construction phase, again being temporary, but of a lesser magnitude and less widely spatially distributed, due to the fact that much of the subsurface infrastructure would be left in-situ at the end of its operational lifetime.

**Table 7.17 Water environment receptors scoped in for further assessment**

| Receptor                             | Likely significant effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction Phase</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Aquatic environment receptors</b> | <p>Deterioration in the water quality of surface water bodies via generation of sediment laden run-off from working areas and discharge of dewatered groundwater from excavations.</p> <p>Potential effects on hydromorphology and flow regime of surface water bodies as a result of increased runoff, dewatering of excavations and sediment inputs from working areas or direct watercourse disturbance (including from new watercourse crossings).</p> <p>Deterioration in the water quality of surface and groundwater bodies affected by disturbance of contaminated land, or accidental spillage of pollutants (e.g. fuel or oil).</p> <p>Deterioration in water quality due to permitted discharges from construction (e.g. treated sewage effluent from welfare facilities or pre-commissioning pipeline testing).</p> <p>Impacts on groundwater levels from dewatering activities and the effects of underground infrastructure.</p> |

| Receptor                                                 | Likely significant effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                          | Impacts on groundwater levels or surface water flow regime arising from abstraction for construction or pre-commissioning pipeline testing.                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Water resource receptors</b>                          | The potential effects noted above for aquatic environment receptors could also have implications for water resource availability.                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Flood risk and building development receptors</b>     | <p>Changes to fluvial or tidal flood risk associated with raised structures in the floodplain (loss of floodplain storage and continuity, and/or change in floodplain flow conveyance).</p> <p>Increased flood risk arising from restricted flow conveyance at trenched pipeline crossings and temporary construction access crossings.</p> <p>Changes to surface water flood risk due to changes in runoff rates and flow pathways resulting from ground disturbance and creation of new impermeable surfaces.</p> |
| <b>Operational and Maintenance Phase</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Aquatic environment and water resources receptors</b> | <p>Changes in shallow groundwater flow and level regime due to presence of underground infrastructure.</p> <p>Changes in channel morphology and fluvial geomorphological processes, should pipelines become exposed at watercourse crossings.</p>                                                                                                                                                                                                                                                                   |
| <b>Flood risk receptors</b>                              | <p>Changes to fluvial or tidal flood risk associated with loss of floodplain storage and/or change in floodplain flow conveyance, where permanent above ground infrastructure is located in tidal or fluvial flood zones.</p> <p>Changes to surface water flood risk due to changes in flow pathways and runoff rates resulting from changed ground levels and creation of new impermeable surfaces for permanent above ground infrastructure.</p>                                                                  |

| Receptor               | Likely significant effects                                                                                                              |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|                        | Changes to groundwater flood risk due to presence of underground infrastructure.                                                        |
| <b>Decommissioning</b> | Likely to be similar to those arising from construction, although probably of a lesser magnitude and less widely spatially distributed. |

### Effects scoped out of further assessment

- 7.8.17 The effects detailed in **Table 7.18** have been scoped out from being subject to further assessment because the effects are not considered likely to be significant.
- 7.8.18 The design life of the pipeline and HAGIs is anticipated as 40 years. It is reasonably expected that a statutory framework will be developed and agreed prior to any decommissioning. Similarly, future technology and good practice would develop and provide for new ways to undertake the process. A Decommissioning Plan will be developed by the Undertaker in accordance with the strategy outlined within **Chapter 2: The Project**.

**Table 7.18 Summary of effects scoped out of the water environment assessment**

| Receptors/potential effects                                                                                       | Justification                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operational phase water quality effects on aquatic environment and water resources</b>                         | Once construction is completed, there would be no routine discharges from the Project to the water environment. Furthermore, operational and maintenance activities would not involve the use of heavy plant or the storage or handling of hydrocarbons or other potentially polluting substances.            |
| <b>Operational phase flow regime effects on surface water receptors (aquatic environment and water resources)</b> | There would be no requirement for abstraction and discharge during the operational phase of the Project, so no effects on the flow status of surface watercourses.                                                                                                                                            |
| <b>Risk of sewer flooding to project infrastructure (all phases)</b>                                              | The baseline risk posed by sewer flooding has been assessed to be generally very low, due in large part to the predominantly rural nature of the Project Preliminary Order Limits. In addition, mitigation for other sources of flood risk (notably surface water flooding) will be provided and will also be |

| Receptors/potential effects | Justification                                                                                                                  |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                             | effective for sewer flooding. Given these considerations, sewer flooding has been scoped out from further specific assessment. |

## 7.9 PEIR Assessment Methodology

### Introduction

- 7.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 3: Approach to preparing the PEIR**, and specifically in **Sections 3.5 to 3.10**. However, whilst this has informed the approach that has been used in this the water environment assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this the water environment assessment.

### Assessment of effects and determining significance

- 7.9.2 The significance level attributed to each effect will be assessed based on the sensitivity of the affected receptor and the magnitude of change resulting from the Project. The level of significance is then determined by the combination of receptor sensitivity and magnitude of change.
- 7.9.3 Receptor sensitivity is assessed on a scale of high, medium, low and very low, whilst magnitude of change is assessed on a scale of high, medium, low and negligible. The criteria for defining sensitivity and magnitude can be found in **Table 7.19** and **Table 7.20**, along with example applications. These criteria are defined and applied based on professional judgement, using recognised approaches to classification relevant to the receptor types, including WFD and the NPPF, all of which represent good practice for water environment assessments within EIAs for Nationally Significant Infrastructure Projects (NSIPs).

### Sensitivity of receptor

- 7.9.4 Definitions of receptor sensitivity used in the assessment are provided in **Table 7.19**, with examples of receptors that would be placed in each class.

**Table 7.19 Definitions of receptor sensitivity**

| Sensitivity | Criteria                                                                                                                      | Examples                                                                                                                    |
|-------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| High        | Aquatic environment feature with a high quality and rarity at an international scale, with little potential for substitution. | Conditions supporting sites with international conservation designations (SAC, SPA, Ramsar sites), where the designation is |

| Sensitivity   | Criteria                                                                                                                                                                 | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p>Water resources supporting human health and economic activity at a regional scale.</p> <p>Property and infrastructure with a very high vulnerability to flooding.</p> | <p>based specifically on aquatic features.</p> <p>High status WFD water bodies (main 'blue line'<sup>124</sup> watercourse and all smaller tributary watercourses not on 'blue line').</p> <p>Regionally important public surface water supplies.</p> <p>Large-scale permitted discharges (e.g. city-scale Wastewater Treatment Works (WWTW) treated effluent discharges).</p> <p>Infrastructure classified in Table 2, Flood risk vulnerability classification, of the NPPF Planning Practice Guidance as 'Essential infrastructure' or the emergency service infrastructure categorised as 'Highly vulnerable'. This includes electricity generating power stations and grid and primary substations as well as essential transport infrastructure. Emergency service infrastructure includes police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.</p> |
| <b>Medium</b> | Aquatic environment feature with a high yield and/or quality and rarity at a national scale, with a limited potential for substitution.                                  | Conditions supporting sites with national conservation designations (e.g. SSSI, NNR) where the designation is based specifically on aquatic features.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

<sup>124</sup> The WFD "blue line" network can be used to determine if a watercourse is significant. Environment Agency (2012). Water Quality Planning: no deterioration and the Water Framework Directive. (online) Available at: [http://www.fwr.org/WQreg/Appendices/No\\_deterioration\\_and\\_the\\_WFD\\_50\\_12.pdf](http://www.fwr.org/WQreg/Appendices/No_deterioration_and_the_WFD_50_12.pdf) (Accessed 22 November 2022).

| Sensitivity | Criteria                                                                                                                                                                                                                                                                                                                                                               | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | <p>Water resources supporting human health and economic activity at a local scale.</p> <p>Property and infrastructure with a high vulnerability to flooding.</p>                                                                                                                                                                                                       | <p>Any designated WFD surface water body at less than High WFD Status (main 'blue line' feature within water body catchment).</p> <p>Local public surface water supplies. Licensed non-public surface water supply abstraction which are large relative to available resource, or where raw water quality is a critical issue, e.g. industrial process water.</p> <p>Medium-scale permitted discharges (e.g. town-scale WWTW treated effluent discharges).</p> <p>Property and infrastructure classified in Table 2, Flood risk vulnerability classification, of the NPPF PPG defined as 'Highly Vulnerable' and 'More Vulnerable' includes all residential premises (hotels and caravan parks) public buildings (e.g. hospitals, schools, libraries, leisure centres), industrial premises (e.g. power stations, chemical plants, incinerators) and waste disposal sites requiring hazardous substances consent.</p> |
| Low         | <p>Aquatic environment feature with a medium yield and/or quality at a regional scale, or good quality at a local scale, with some potential for substitution.</p> <p>Water resources supporting human health and economic activity at household/individual business scale.</p> <p>Property and infrastructure s with a moderate to low vulnerability to flooding.</p> | <p>Sites with local conservation designations (e.g. LNRs, County Wildlife Sites and Sites of Importance for Nature Conservation), where the designation is based specifically on aquatic features.</p> <p>Smaller tributary watercourses within the WFD water body not on main 'blue line' (for water bodies at "Good" status or below)</p> <p>Licensed non-public surface water supply abstractions which are</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Sensitivity     | Criteria                                                                                                                                                                                                                                                                                     | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                                                                                                                                                                                                                                                                              | <p>small relative to available resource, or where raw water quality is not important, e.g., cooling water, spray irrigation. Unlicensed potable surface water abstractions, e.g. private domestic water supplies.</p> <p>Small-scale permitted discharges (e.g. village-scale WWTW discharges)</p> <p>Property and infrastructure classified in Table 2, Flood risk vulnerability classification, of the NPPF Planning Practice Guidance as 'Less Vulnerable'. Includes general industrial, commercial, and retail premises, car parks, mineral extraction sites, and buildings used for forestry and agriculture.</p>                                                             |
| <b>Very Low</b> | <p>Aquatic environment feature with a low yield and/or quality at a local scale, with good potential for substitution.</p> <p>Water resources that do not support human health, and of only limited economic benefit.</p> <p>Property and infrastructure that are resilient to flooding.</p> | <p>Minor watercourses with low habitat potential, e.g. agricultural, forestry or road-side drainage ditches.</p> <p>Unlicensed non-potable surface water abstractions, (e.g., livestock supplies).</p> <p>Small discharges exempt from permitting subject to adherence to general binding rules (e.g., package plants from small residential developments or commercial premises in rural areas).</p> <p>Infrastructure classified in Table 2, Flood risk vulnerability classification, of the NPPF Planning Practice Guidance as 'Water Compatible'. This is infrastructure required in a fluvial, tidal, or coastal location and which is resilient to flooding (e.g., flood</p> |

| Sensitivity | Criteria | Examples                                                                                                                                                         |
|-------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |          | control infrastructure, water transmission infrastructure). Also, rural land such as forestry and agricultural land that does not contain any built development. |

### Magnitude of change

- 7.9.5 The magnitude of change from baseline conditions includes a consideration of the duration and reversibility of the change, and relevant legislation, policy standards and guidance. **Table 7.20** provides examples of how various magnitudes of change could be determined with respect to water features.
- 7.9.6 Magnitude of change may be either positive or negative. The criteria and examples in **Table 7.20** focus on negative changes, but positive changes may also occur and will be considered on a case-by-case basis as required.

**Table 7.20 Definitions of magnitude of change**

| Magnitude | Criteria                                                                                                  | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High      | Results in complete loss or major change to feature, of sufficient magnitude to affect its use/integrity. | <p>Deterioration in river flow regime, morphology or water quality, leading to sustained, permanent or long-term breach of relevant designated site conservation objectives (COs) or non-temporary downgrading (deterioration) of WFD surface water body status (including downgrading of individual WFD elements), or resulting in the inability of the surface water body to attain “Good” ecological potential as well as “Good” ecological status by the relevant deadline in line with the measures identified in the RBMP.</p> <p>Deterioration in groundwater levels, flows or water quality, leading to non-temporary downgrading of WFD groundwater body status, or the inability of the groundwater body to attain “Good” status in line with the measures identified in the RBMP.</p> <p>Complete or severely reduced water availability and/or quality, compromising the ability of water users to abstract.</p> |

| Magnitude     | Criteria                                                                                                                            | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                                                                                                                     | Change in flood risk resulting in potential loss of life or major damage to the property or infrastructure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Medium</b> | Results in partial loss or noticeable change to feature, of sufficient magnitude to affect its use/integrity in some circumstances. | <p>Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant COs, or potential temporary downgrading of surface water body status (including potential temporary downgrading of individual WFD elements), although not affecting the ability of the surface water body to achieve future WFD objectives.</p> <p>Deterioration in groundwater levels, flows or water quality, leading to potential temporary downgrading of WFD groundwater body status, although not affecting the ability of the groundwater body to achieve future WFD objectives.</p> <p>Moderate reduction in water availability and/or quality, which may compromise the ability of the water user to abstract on a temporary basis or for limited periods, with no longer-term impact on the purpose for which the water is used.</p> <p>Change in flood risk resulting in potential for moderate damage to the property or infrastructure.</p> |
| <b>Low</b>    | Results in minor change to feature, with insufficient magnitude to affect its use/integrity in most circumstances.                  | <p>Measurable effect on river flow regime, morphology or water quality, but remaining generally within COs, and with no short-term or permanent change to WFD surface water body status (of overall status or element status).</p> <p>Measurable effect on groundwater levels, flows or water quality, but with no short-term or permanent downgrading of WFD groundwater body status.</p> <p>Minor reduction in water availability and/or quality, but unlikely to affect the ability of a water user to abstract.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Magnitude         | Criteria                                                                                           | Examples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                                                                                    | Change in flood risk resulting in potential for minor damage to property or infrastructure.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Negligible</b> | Results in little or no change to feature, with insufficient magnitude to affect its use/integrity | <p>No measurable effect on river flow regime, morphology or water quality, and no consequences in terms of COs or surface water body status.</p> <p>No measurable effect on groundwater levels, flows or water quality, and no consequences in terms of WFD groundwater body status.</p> <p>No measurable change in water availability or quality and no change in ability of the water user to exercise licensed rights.</p> <p>Increased frequency of flood flows, but which does not pose an increased risk to property or infrastructure.</p> |

7.9.7

During the assessment of effects for each identified receptor the sensitivity value in **Table 7.19** will be combined with the magnitude of change from **Table 7.20** to produce an overall significance rating based on the evaluation matrix shown in **Table 7.21**. A 'significant' effect is assessed as a Major rating whereas a Moderate rating will be considered to be 'potentially significant' at this stage of the EIA process. Any effects found to be 'potentially significant' at PEIR stage will be subject to further investigation as part of the ES and following refinement of design/mitigation information, a final, definitive conclusion on significance will be provided. This approach will be based on professional judgement and carried out on a precautionary basis.

Table 7.21 Significance evaluation matrix

|             |          | Magnitude of change                |                                    |                                    |                              |
|-------------|----------|------------------------------------|------------------------------------|------------------------------------|------------------------------|
|             |          | High                               | Medium                             | Low                                | Negligible                   |
| Sensitivity | High     | Major (Significant)                | Major (Significant)                | Moderate (Potentially significant) | Minor (Not significant)      |
|             | Medium   | Major (Significant)                | Moderate (Potentially significant) | Minor (Not significant)            | Negligible (Not significant) |
|             | Low      | Moderate (Potentially significant) | Moderate (Potentially significant) | Negligible (Not significant)       | Negligible (Not significant) |
|             | Very Low | Moderate (Potentially significant) | Negligible (Not significant)       | Negligible (Not significant)       | Negligible (Not significant) |

## 7.10 Preliminary Assessment of Water Environment Effects

### Overview

- 7.10.1 The construction phase includes all activities that are required to construct the sub-surface pipeline, installation of HAGIs and other surface infrastructure (such as metering facilities, in-line inspection facilities, instrumentation and control Block Valves, cathodic protection and marker posts). Construction would comprise the excavation of trenches (open cut installation technique) for the installation of the pipeline along the route. A range of options are identified for the trenchless crossings identified in **Chapter 2: The Project (Section 2.5)**.
- 7.10.2 The Preliminary Order Limits have been developed to include areas for pipe and other material storage ('material storage areas') along the corridors. A reasonable worst-case assessment has been carried out to ensure that the various pipeline corridor options and HAGI locations have each been fully taken into account within the following assessment sections.
- 7.10.2.1 During the operational phase, potential effects on the water environment would be minimal. The pipeline network is being built to carry hydrogen. Consequently, there is unlikely to be a risk of pollution to the water environment should there be a leak during the operational phase. Design and embedded environmental measures, including maintenance procedures and adoption of standard good practice measures, would ensure that pollution of the water environment is avoided during the operational phase (for example from spills and leaks during maintenance visits to the HAGIs).

- 7.10.2.2 Decommissioning effects are likely to be similar to construction effects, but given the intention to leave the pipeline within the ground, of a lesser magnitude and spatial extent.
- 7.10.3 On the basis that construction effects can generally be satisfactorily mitigated by embedded measures, it is expected that this would be also true for decommissioning phase works. However, these would need to be subject to full assessment at the appropriate time, when detailed proposals are put forward, and according to the baseline and regulatory context prevailing at that time of decommissioning works.

## Construction Phase

- 7.10.4 The pipeline would be a multi-diameter pipeline transportation network and as such each section would have a specific temporary working pipeline construction corridor width. As an example, for a maximum 42" pipeline the working width would be expected to be up to a minimum of 36m. A wider working width, known as a box-out section, would be required in some instances e.g., at crossings including trenchless crossings and where the pipeline route changes direction. This is to facilitate safe working, additional spoil storage and equipment laydown. Access tracks would also be constructed to facilitate the movement of construction vehicles and plant.
- 7.10.5 Whilst the target excavation depth of the pipeline would be on average a 2.5-3m deep trench it may be a greater depth particularly where the pipeline is 42" in diameter. Also, where the pipeline passes beneath services and other crossings (including watercourses) it may be approximately 6m deep, with HDD crossings, if this technique is used, being significantly deeper.
- 7.10.6 Access tracks would generally be installed with aggregate along the designated route, following initial topsoil stripping activities. Installation of the pipeline would require watercourse crossings. Pipeline crossings may be achieved using a variety of methods including: open cut, auger bore, micro tunnel and HDD. Temporary haul road watercourse crossings would also be required for construction access in some areas.
- 7.10.7 The works would require a number of temporary site compounds, which would also require topsoil stripping to provide a suitable area and the laying of aggregate. Temporary construction compound areas would include storage of material, waste, and equipment and welfare facilities. Typically, these would be at HAGI locations.
- 7.10.8 The construction of the HAGIs and Block Valves would include the establishment of a temporary construction compound with associated storage and offices/welfare facilities, topsoil storage, installation of drainage systems and the development of below ground foundation structures. For the purposes of assessment, the entire HAGI footprint is assumed to be between 0.5ha to 1.5ha. Block Valve compounds would typically be less than 0.5ha in area. Additional areas would also be required at each site for construction. The foundations would necessitate excavations and may require piling depending on ground conditions, the requirements of which are to be specified after preliminary GI works are completed.

- 7.10.9 The pipeline corridors, locations of HAGIs and Block Valves and Preliminary Order Limits for construction have been specified to avoid sensitive environmental features and engineering constraints. Water environment constraints considered in this exercise include the presence of major watercourses and the distribution of tidal and fluvial flood zones. A key area of potential concern for this assessment relates to pipeline watercourse crossings and interactions with these zones that have been identified along the pipeline corridors and given careful consideration at the outline design process, as documented within the draft crossing schedule to inform the assessment in this PEIR, and is shown in **Appendix 2A**<sup>125</sup>. Watercourse crossings would also be required for temporary construction access routes and a number of embedded environmental measures have been specified to minimise potential effects on water environment receptors during all project phases, but particularly during construction, when the greatest potential for effects is considered to occur. These are summarised in **Table 7.15**.
- 7.10.10 **Table 7.22** provides a preliminary assessment of the potentially adverse effects on the water environment associated with the construction of the proposed pipeline, HAGIs and Block Valves. At this preliminary stage of the assessment, this is a generic assessment for all sections of pipeline (for all options) and HAGI and Block Valve locations.
- 7.10.11 The Preliminary Order Limits lie within the catchments of the Weaver Gow, Lower Mersey and Upper Mersey identified in **Section 7.2.6**. Therefore, each of the water environment receptors that were screened in **Table 7.16** have a potential connection to the pipeline construction corridor. For the purposes of clear presentation the receptors have been grouped into their generic types.
- 7.10.12 The range of the sensitivity, magnitude and significance definitions for each potential effect are given within **Table 7.19**, **Table 7.20** and **Table 7.21** respectively. The magnitude, and the significance, of effects have been assessed on the assumption that the embedded environmental measures listed in **Table 7.15** are effectively implemented. On the basis of these measures being successfully implemented there would be no material difference in the predicted magnitude and significance of effect assessed between the different pipeline corridor routing options and/or between the different HAGI and Block Valve locations as summarised at the start of **Section 7.6**.

### *Aquatic Environment*

- 7.10.13 Any reductions in groundwater levels arising from dewatering of the trenched excavations for pipeline, HAGIs and Block Valve construction are likely to be temporary, localised and of minimal magnitude, given the relatively shallow depth of the trench compared to the deeper WFD water bodies and aquifers. The current status of WFD groundwater bodies is

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<sup>125</sup> HyNet North West Hydrogen Pipeline FEED - Pipeline Crossing Schedule, May 2022, Cadent Gas. HYN02-PL-SCH-WDG-0000-0001 Rev: A02

“Poor”, giving a Medium sensitivity for these receptors. Effects may be locally greater at crossing locations where the depth of excavations are deeper, and/or where shallower groundwater features are encountered (such as in valley floor locations around watercourses). Even so, given the short period of time and scale of construction most effects are likely to be Negligible to Low. Similarly, the influence on groundwater levels due to the development of less permeable access track or temporary construction compound establishment reducing infiltration can be mitigated through design and embedded environmental measures, and any effects are likely to be Negligible. The overall significance of effect on declines in groundwater levels is likely to be Negligible to Minor (**Not Significant**). (**Table 7.22**).

- 7.10.14 There is the potential for accidental contamination entering groundwater or watercourses, associated with spillage or leakage of fuels, lubricants or other chemicals (including the potential for leakage of bentonite during HDD) during construction. The current status/potential of WFD groundwater and surface water bodies range from “Moderate” to “Poor” giving a Medium sensitivity for these receptors. Potential effects would be mitigated by embedded measures and the implementation of a CoCP and associated PPP, DWMP and MMP. Specific mitigation will be in place for trenched crossings for the pipeline and associated haul roads at watercourse crossing locations and a WCP would be developed. Where receptors are particularly close to working areas or where pathways to receptors need to be better defined, for example at HDD crossings, a specific screening exercise would be undertaken to establish groundwater receptor vulnerability and a robust mitigation strategy developed to protect abstractions (surface and groundwater) and/or aquifers. On the basis of embedded environmental measures being implemented, the effect of contamination occurring is considered to have a Negligible change and therefore Negligible (**Not Significant**) effect (**Table 7.22**).
- 7.10.15 Without appropriate mitigation measures in place, construction activities have the potential to cause elevated ingress of suspended sediments (with associated nutrients and other contaminants) into surface water bodies. However, a range of measures are proposed in **Table 7.15** avoid this, the details of which would be developed during construction planning as part of the DWMP and CoCP (preparation of which would be secured via a DCO requirement). As a consequence, general project construction activities are assessed to cause a Negligible change in the ingress of sediments and associated nutrients and contaminants into watercourses and are therefore likely to have a Negligible and **Not Significant** effect (**Table 7.22**). In the specific case of trenched crossings of minor watercourses, it is recognised that works in and immediately around watercourses have a greater risk of suspended sediment ingress or direct disturbance of channel bed and bank sediments, although these risks are temporary and localised. Nevertheless, taking a precautionary approach, the magnitude of this change is assessed as being Low and therefore the effect Minor (**Not Significant**), on the basis that that the relevant embedded mitigation measures in **Table 7.15** are implemented via the WCP and CoCP.

- 7.10.15.1 The other mechanism by which the nutrient status of receiving surface water bodies could be impacted by construction is from discharge of foul sewage arisings from temporary site offices and worker welfare facilities. Although the arrangements for foul sewage treatment and disposal for the construction phase of the Project are yet to be confirmed, appropriate treatment and disposal of sewage would be provided where no foul sewer is available to ensure protection of the water environment. Should discharge of treated effluent to watercourses or to land be required, this would be subject to an Environmental Permit. On this basis, any changes to the nutrient status of receiving water bodies are considered to be of Negligible magnitude and the effect to be Negligible (**Not Significant**) as a consequence.
- 7.10.16 Changes to watercourse morphology during trenchless watercourse crossings with the implementation of the embedded environmental measures in place are considered to have a Negligible magnitude of change and therefore the effect to be Negligible (**Not Significant**) (**Table 7.22**).
- 7.10.17 Changes to watercourse morphology as a result of works in or near watercourses (e.g. trenched works, installation of watercourse crossings and associated earthworks) would be temporary, localised, and would only impact smaller watercourses. Given these considerations, together with implementation of embedded environmental measures, any changes arising from trenched pipeline crossings on the morphology and connectivity of surface WFD water bodies would be of Negligible magnitude and would therefore have a Negligible (**Not Significant**) effect (**Table 7.22**). However, temporary access crossings (installation of culverts or clear span bridges) are likely to be in place for a longer period (up to months in duration). In recognition of this the potential effect of these crossings on surface water body morphology and connection is assessed as having a Low magnitude of change, leading to a Minor (**Not Significant**) effect (**Table 7.22**).
- 7.10.18 A reduction of water availability to support existing groundwater or surface water designated sites, ecosystems and features could arise from dewatering of the trenched excavations for the pipeline, HAGIs and Block Valves, ground disturbance for the development of temporary access track establishment, or the leakage or spillage of fuels and chemicals onsite. Conservation site receptors range from High to Medium sensitivity based on their designation, with the Mersey Estuary being of High sensitivity due to its Ramsar and SPA designation. The magnitude of any effects arising from impacts on quality and/or quantity of water supply to the sites are likely to be Negligible, given the temporary nature of works, embedded measures, and in many cases the distance of sites from the works (dilution effects), resulting in a Negligible (**Not Significant**) effect (**Table 7.22**).

### Water resources

- 7.10.19 For water resource receptors there is a risk in the reduction of water availability to support existing surface water and groundwater abstractions as a consequence of water quantity and/or quality effects. This could arise

from dewatering of the trenched excavations for the pipeline, HAGIs and Block Valves, ground disturbance for the development of temporary access track and/or temporary construction compound establishment. Based on abstraction demand compared to the available resource, public water supply receptors are of a Medium sensitivity whilst other licenced abstractions (surface and groundwater) are of Low sensitivity (i.e. on the basis that they are locally, rather than regionally important, and are for non-public water supply use).

- 7.10.20 For public water supply receptors potential effects would be mitigated by embedded measures and implementation of a CoCP and associated PPP, DWMP and MMP. Works associated with the pipeline, HAGIs and Block Valves construction would also be shallow and temporary reducing the likelihood of impacts. However, in the case where the Preliminary Order limits is found to intersect Source Protection Zones (SPZs) and likely abstraction zones of influence then a specific screening exercise will be undertaken to establish groundwater receptor vulnerability and a robust mitigation strategy developed to protect abstractions (surface and groundwater) and/or aquifers. This would be particularly true for receptors close to HDD crossings where excavations would be deeper within the subsurface and/or closer to watercourses. Bentonite breakout associated with HDD works would be mitigated through the assessment of risks and borehole design prior to drilling (e.g. casing out prominent fractures) and then the monitoring of mud volumes and downhole annular pressures during drilling that may indicate that losses were occurring so that drilling can stop and corrective measures put in place. Appropriate method statements would detail works and emergency responses.
- 7.10.20.1 There may be a requirement to use water for dust suppression during construction activities in the summer months. In addition, there would be a requirement for pre-commissioning hydraulic testing at the end of construction. Exact volumes required for these activities are yet to be specified, but any abstraction would be licenced on availability and permitted appropriately. After testing water would need to be discharged. These would be subject to abstraction licensing and discharge permits as required and consideration would be given to discharging at multiple locations to reduce impacts on receiving watercourses.
- 7.10.21 Notwithstanding the above, any effects on the reduction of water availability to support existing surface water and groundwater abstractions are likely to be Low to Negligible. The effect is therefore likely to be Minor to Negligible **(Not Significant) (Table 7.21)**.
- 7.10.22 Physical disruption to existing discharge infrastructure (e.g. septic tank soakaways or discharge outfalls) from trenching and temporary access track or temporary construction compound establishment can be prevented through embedded measures, particularly through micro-siting of construction activities and infrastructure. Only four discharge licences exist within the Preliminary Order Limits and these receptors are likely of a Low sensitivity, being of a small-scale permitted discharges (e.g. local-scale WWTW treated effluent discharges) and likely small discharges (although discharge volume data was not supplied by the Environment Agency). Any

effects on the discharge infrastructure are likely to be Negligible, resulting in a Negligible (**Not Significant**) effect (**Table 7.21**).

### *Flood Risk*

- 7.10.23 Flood risk receptors include the elements of the construction activities associated with the Project as well as external (non-Project) receptors in their vicinity. At this stage it is not possible to identify every specific receptor. Taking a precautionary approach, it has been assumed that receptor sensitivity ranges from Very Low up to High for this preliminary assessment.
- 7.10.24 The risk of flooding to temporary construction infrastructure (material storage areas; HAGI compounds, and trenchless crossing compounds) would be mitigated through preferential siting, sequential design and timing of works to occur during the driest months of the year. Residual flood risks would be managed through the preparation of a FERP. Any effects on the temporary construction infrastructure are likely to be Negligible (**Not Significant**).
- 7.10.25 A potential increase in flood risk to receptors could arise from volumetric displacement, or interruption of conveyance of flood water associated with the construction of temporary stockpiles and infrastructure and raised access tracks within floodplain areas. This loss of floodplain storage through construction is mitigated through preferential siting, sequential design, and minimising raised structures in areas of floodplain. Where raised structures cannot be avoided, appropriate mitigation would be provided, such as aligning features with flow directions, leaving gaps and providing cross-drainage. This would be secured via embedded measure C-24 (**Table 7.15**) which would include a CoCP and FRA to ensure compliance. Effects on receptors are likely to be Negligible (**Not Significant**).
- 7.10.26 Potential increases in flood risk to external receptors due to the loss of channel conveyance, as a result of new temporary access road bridges, would be mitigated through crossing design to ensure impacts on channel conveyance and flood storage are minimised. Based on the location of the temporary access routes through predominantly rural areas the effects on receptors are likely to be Negligible (**Not Significant**).
- 7.10.27 Changes to in channel conveyance due to the installation of pipeline crossings would be managed through design and through embedded environmental measures during construction. Crossings of major watercourses would be trenchless to avoid any disruption to the channel and conveyance capacity. Trenched open cut pipeline crossings of minor watercourses would be temporary and localised. The crossing methodology would include mitigation through the isolation of the watercourse at the crossing location with fluming or over pumping during pipeline installation and re-instatement to existing capacity following completion of works. Therefore, effects on receptors are likely to be Negligible (**Not Significant**).

- 7.10.28 For surface water run-off potential effects to external receptors would be mitigated by embedded measures and implementation of a CoCP and associated DWMP. Any effects on off-site receptors due to the increase in surface water run-off are likely to be Negligible (**Not Significant**).
- 7.10.28.1 Overall, the significance of effect to flood risk receptors is Minor to Negligible (**Not Significant**) (**Table 7.21**).

Table 7.22 Residual effects during the pipeline construction, HAGIs and Block Valves

| Receptor groups                 | Activity and potential effect                                                                                                                                                                                                            | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Sensitivity | Magnitude of effect | Significance of effect                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
| <b>Aquatic Environment</b>      |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                     |                                               |
| Groundwater WFD<br>Water bodies | A decline in groundwater levels arising from dewatering of the trenched or trenchless excavations for pipeline or the development of less permeable access track or temporary construction compound establishment reducing infiltration. | <p><b>Overall design:</b><br/> <b>D-2:</b> Optimisation of routing<br/> <b>D-5:</b> Management of subsurface flow pathway</p> <p><b>Construction - general:</b><br/> <b>C-1:</b> A Code of Construction Practice (CoCP)</p> <p><b>Construction - water and silt management:</b><br/> <b>C-2:</b> Drainage and Water Management Plan (DWMP)<br/> <b>C-5:</b> Private abstraction risk assessment and mitigation strategy<br/> <b>C-7:</b> Management of dewatering of excavations<br/> <b>C-10:</b> Timely reinstatement following completion of works<br/> <b>Construction - pollution prevention:</b><br/> <b>C-19:</b> A monitoring and inspection programme</p> | Medium      | Negligible – Low    | Negligible – Minor ( <b>Not Significant</b> ) |

| Receptor groups                                                                  | Activity and potential effect                                                                                                                                                                                              | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sensitivity | Magnitude of effect | Significance of effect       |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------------|
|                                                                                  |                                                                                                                                                                                                                            | <b>C-21:</b> Pre-commissioning pipeline testing<br><br><b>Construction - watercourse crossings:</b><br><b>C-25:</b> A Watercourse Crossing Plan (WCP)<br><b>C-26:</b> Trenchless pipeline crossings                                                                                                                                                                                                                                                                          |             |                     |                              |
| Groundwater and Surface Water WFD Water bodies (River, Transitional and Coastal) | Potential for accidental contamination entering groundwater or watercourses, associated with spillage or leakage of fuels, lubricants or other chemicals. This includes the potential for leakage of bentonite during HDD. | <b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-3:</b> Timing of works<br><b>C-4:</b> Diversion and reinstatement of existing drainage networks<br><b>C-5:</b> Private abstraction risk assessment and mitigation strategy<br><b>C-6:</b> Temporary provision of surface water drainage for construction areas | Medium      | Negligible          | Negligible (Not Significant) |

| Receptor groups | Activity and potential effect | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sensitivity | Magnitude of effect | Significance of effect |
|-----------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------|
|                 |                               | <p><b>C-7:</b> Management of dewatering of excavations</p> <p><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure</p> <p><b>C-11:</b> Permitting of discharges</p> <p><b>Construction - pollution prevention:</b></p> <p><b>C-13:</b> A Pollution Prevention Plan (PPP)</p> <p><b>C-14:</b> Storage of hydrocarbons and other chemicals:</p> <p><b>C-15:</b> Refuelling, inspection and maintenance</p> <p><b>C-16:</b> Handling and processing of concrete</p> <p><b>C-17:</b> Measures to avoid pollution impacts from disturbance of contaminated land (Materials Management Plan, MMP)</p> <p><b>C-18:</b> Treatment and discharge of contaminated groundwater</p> <p><b>C-19:</b> A monitoring and inspection programme</p> |             |                     |                        |

| Receptor groups                                                  | Activity and potential effect                                                                                                                      | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                           | Sensitivity | Magnitude of effect | Significance of effect                        |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                                                                  |                                                                                                                                                    | <b>Construction - watercourse crossings:</b><br><b>C-25:</b> A Watercourse Crossing Plan (WCP)<br><b>C-26:</b> Trenchless pipeline crossings<br><b>C-27:</b> Trenched crossings of minor watercourses<br><b>C-28:</b> Temporary construction access watercourse crossings                                                                                                                 |             |                     |                                               |
| Surface Water WFD Water bodies (River, Transitional and Coastal) | Ground disturbance and mobilisation of sediments and/or contaminants leading to silt laden or otherwise contaminated runoff entering watercourses. | <b>Overall design:</b><br><b>D-4:</b> Temporary access tracks design<br><br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-3:</b> Timing of works<br><b>C-4:</b> Diversion and reinstatement of existing drainage networks | Medium      | Negligible - Low    | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Sensitivity | Magnitude of effect | Significance of effect |
|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------|
|                 |                               | <p><b>C-5:</b> Private abstraction risk assessment and mitigation strategy</p> <p><b>C-6:</b> Temporary provision of surface water drainage for construction areas</p> <p><b>C-7:</b> Management of dewatering of excavations</p> <p><b>C-8:</b> Silt management measures</p> <p><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure</p> <p><b>C-10:</b> Timely reinstatement following completion of works</p> <p><b>C-11:</b> Permitting of discharges</p> <p><b>C-12:</b> Discharge outfall design</p> <p><b>Construction - watercourse crossings:</b></p> <p><b>C-25:</b> A Watercourse Crossing Plan (WCP)</p> <p><b>C-26:</b> Trenchless pipeline crossings</p> <p><b>C-27:</b> Trenched crossings of minor watercourses</p> <p><b>C-28:</b> Temporary construction access watercourse crossings</p> |             |                     |                        |

| Receptor groups | Activity and potential effect                                                                                                                          | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sensitivity | Magnitude of effect | Significance of effect                       |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|----------------------------------------------|
|                 | Changes to watercourse morphology as a result of works in or near watercourses (e.g. installation of watercourse crossings and associated earthworks). | <p><b>Overall design:</b><br/> <b>D-1:</b> Underground pipeline<br/> <b>D-2:</b> Optimisation of routing</p> <p><b>Construction - general:</b><br/> <b>C-1:</b> A Code of Construction Practice (CoCP)</p> <p><b>Construction - water and silt management:</b><br/> <b>C-2:</b> Drainage and Water Management Plan (DWMP)<br/> <b>C-3:</b> Timing of works<br/> <b>C-7:</b> Management of dewatering of excavations<br/> <b>C-8:</b> Silt management measures<br/> <b>C-10:</b> Timely reinstatement following completion of works<br/> <b>C-12:</b> Discharge outfall design</p> <p><b>Construction - watercourse crossings:</b></p> | Medium      | Negligible - Low    | Negligible/ Minor ( <b>Not Significant</b> ) |

| Receptor groups    | Activity and potential effect                                                                                                                                                                                                                                                                                                                                        | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                             | Sensitivity | Magnitude of effect | Significance of effect       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------------|
|                    |                                                                                                                                                                                                                                                                                                                                                                      | <b>C-25:</b> A Watercourse Crossing Plan (WCP)<br><b>C-26:</b> Trenchless pipeline crossings<br><b>C-27:</b> Trenched crossings of minor watercourses<br><b>C-28:</b> Temporary construction access watercourse crossings                                                                                                                                                                   |             |                     |                              |
| Conservation Sites | Reduction of water availability to support existing groundwater or surface water designated or undesignated sites, ecosystems and features. This could arise from dewatering of the trenched excavations for the pipeline, ground disturbance for the development of temporary access track establishment, or the leakage or spillage of fuels and chemicals onsite. | <b>Overall design:</b><br><b>D-1:</b> Underground pipeline<br><b>D-2:</b> Optimisation of routing<br><b>D-4:</b> Temporary access tracks design<br><br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-3:</b> Timing of works | High - Low  | Negligible          | Negligible (Not Significant) |

| Receptor groups | Activity and potential effect | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Sensitivity | Magnitude of effect | Significance of effect |
|-----------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------|
|                 |                               | <p><b>C-6:</b> Temporary provision of surface water drainage for construction areas</p> <p><b>C-7:</b> Management of dewatering of excavations</p> <p><b>C-8:</b> Silt management measures</p> <p><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure</p> <p><b>C-10:</b> Timely reinstatement following completion of works</p> <p><b>C-11:</b> Permitting of discharges</p> <p><b>Construction - pollution prevention:</b></p> <p><b>C-13:</b> A Pollution Prevention Plan (PPP)</p> <p><b>C-14:</b> Storage of hydrocarbons and other chemicals:</p> <p><b>C-15:</b> Refuelling, inspection and maintenance</p> <p><b>C-16:</b> Handling and processing of concrete</p> <p><b>C-17:</b> Measures to avoid pollution impacts from disturbance of</p> |             |                     |                        |

| Receptor groups                              | Activity and potential effect                                                                       | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Sensitivity | Magnitude of effect | Significance of effect                        |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                                              |                                                                                                     | <p>contaminated land (Materials Management Plan, MMP)</p> <p><b>C-18:</b> Treatment and discharge of contaminated groundwater</p> <p><b>C-19:</b> A monitoring and inspection programme</p> <p><b>C-20:</b> Foul drainage from temporary compounds</p> <p><b>Construction - watercourse crossings:</b></p> <p><b>C-25:</b> A Watercourse Crossing Plan (WCP)</p> <p><b>C-26:</b> Trenchless pipeline crossings</p> <p><b>C-27:</b> Trenched crossings of minor watercourses</p> <p><b>C-28:</b> Temporary construction access watercourse crossings</p> |             |                     |                                               |
| <b>Water Resources</b>                       |                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                     |                                               |
| Licensed abstractions –public water supplies | Reduction of water availability to support existing surface water and groundwater abstractions as a | <p><b>Overall design:</b></p> <p><b>D-1:</b> Underground pipeline</p> <p><b>D-2:</b> Optimisation of routing</p> <p><b>D-4:</b> Temporary access tracks design</p>                                                                                                                                                                                                                                                                                                                                                                                      | Medium      | Negligible - Low    | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups                 | Activity and potential effect                                                                                                                                                                                                                                                                                     | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Sensitivity | Magnitude of effect | Significance of effect                        |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
| Other (non-public) abstractions | consequence of water quantity and/or quality effects. This could arise from dewatering of the trenched excavations for the pipeline, ground disturbance for the development of temporary access track or temporary construction compound establishment, or the leakage or spillage of fuels and chemicals onsite. | <b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-5:</b> Private abstraction risk assessment and mitigation strategy<br><b>C-6:</b> Temporary provision of surface water drainage for construction areas<br><b>C-7:</b> Management of dewatering of excavations<br><b>C-8:</b> Silt management measures<br><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure<br><b>C-10:</b> Timely reinstatement following completion of works<br><b>C-11:</b> Permitting of discharges | Low         | Negligible - Low    | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Sensitivity | Magnitude of effect | Significance of effect |
|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|------------------------|
|                 |                               | <p><b>Construction - pollution prevention:</b></p> <p><b>C-13:</b> A Pollution Prevention Plan (PPP)</p> <p><b>C-14:</b> Storage of hydrocarbons and other chemicals:</p> <p><b>C-15:</b> Refuelling, inspection and maintenance</p> <p><b>C-16:</b> Handling and processing of concrete</p> <p><b>C-17:</b> Measures to avoid pollution impacts from disturbance of contaminated land (Materials Management Plan, MMP)</p> <p><b>C-18:</b> Treatment and discharge of contaminated groundwater</p> <p><b>C-19:</b> A monitoring and inspection programme</p> <p><b>C-20:</b> Foul drainage from temporary compounds</p> <p><b>Construction - watercourse crossings:</b></p> <p><b>C-25:</b> A Watercourse Crossing Plan (WCP)</p> <p><b>C-26:</b> Trenchless pipeline crossings</p> |             |                     |                        |

| Receptor groups             | Activity and potential effect                                                                                                                                                                           | Embedded environmental measures                                                                                                                                                                                                                                         | Sensitivity | Magnitude of effect | Significance of effect               |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|--------------------------------------|
|                             |                                                                                                                                                                                                         | <b>C-27:</b> Trenched crossings of minor watercourses<br><b>C-28:</b> Temporary construction access watercourse crossings                                                                                                                                               |             |                     |                                      |
| Consented discharges        | Physical disruption to existing discharge infrastructure (e.g. septic tank soakaways or discharge outfalls) from trenching and temporary access track or temporary construction compound establishment. | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/sewerage infrastructure | Low         | Negligible          | Negligible (Not Significant)         |
| <b>Flood Risk</b>           |                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                         |             |                     |                                      |
| <b>Flood Risk Receptors</b> | Positioning of temporary stockpiles, compounds, equipment and staff in areas of known flood risk.                                                                                                       | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b>                                                               | Low – High  | Negligible          | Negligible - Minor (Not Significant) |

| Receptor groups | Activity and potential effect                                                                                                                                                                               | Embedded environmental measures                                                                                                                                                                                                                                                                                                     | Sensitivity | Magnitude of effect | Significance of effect                        |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                 |                                                                                                                                                                                                             | <b>C-3:</b> Timing of works<br><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure<br><b>Construction - flood risk:</b><br><b>C-22:</b> Preferential siting<br><b>C-23:</b> Flood Emergency Response Plan (FERP)<br><b>C-24:</b> Minimise raised structures in floodplains. |             |                     |                                               |
|                 | Volumetric displacement of flood water or interruption of surface water pathways associated with the construction of temporary stockpiles, infrastructure and raised access tracks within floodplain areas. | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>D-4:</b> Temporary access tracks design<br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b><br><b>C-3:</b> Timing of works                                              | Low – High  | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect                                                      | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                      | Sensitivity | Magnitude of effect | Significance of effect                        |
|-----------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                 |                                                                                    | <b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure<br><b>Construction - flood risk:</b><br><b>C-22:</b> Preferential siting:<br><b>C-24:</b> Minimise raised structures in floodplains                                                                                                                                                      |             |                     |                                               |
|                 | Changes in watercourse conveyance associated with temporary watercourse crossings. | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>D-4:</b> Temporary access tracks design<br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b><br><b>C-3:</b> Timing of works<br><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/sewerage infrastructure | Low – High  | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect                                         | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                           | Sensitivity | Magnitude of effect | Significance of effect                        |
|-----------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                 |                                                                       | <b>Construction - watercourse crossings:</b><br><b>C-25:</b> Watercourse Crossing Plan (WCP)<br><b>C-28:</b> Temporary construction access watercourse crossings                                                                                                                                                                                                                                                                                          |             |                     |                                               |
|                 | Changes in watercourse conveyance associated with pipeline crossings. | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b><br><b>C-3:</b> Timing of works<br><b>C-9:</b> Stand-off distances from watercourses, flood defences and water supply/ sewerage infrastructure<br><b>Construction - watercourse crossings:</b><br><b>C-25:</b> A Watercourse Crossing Plan (WCP) | Low – High  | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect                                                                                                                                              | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sensitivity | Magnitude of effect | Significance of effect                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                 |                                                                                                                                                                            | <b>C-26:</b> Trenchless pipeline crossings<br><b>C-27:</b> Trenched crossings of minor watercourses                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                     |                                               |
|                 | Changes in runoff rates and new flow pathways associated with ground disturbance and the development of temporary access tracks and temporary construction compound areas. | <b>Overall design:</b><br><b>D-4:</b> Temporary access tracks design<br><b>D-5:</b> Management of subsurface flow pathways<br><b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-3:</b> Timing of works<br><b>C-4:</b> Diversion and reinstatement of existing drainage networks<br><b>C-6:</b> Temporary provision of surface water drainage for construction areas | Low – High  | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

| Receptor groups | Activity and potential effect                                       | Embedded environmental measures                                                                                                                                                                                                                                                                                                                                                                                                                              | Sensitivity | Magnitude of effect | Significance of effect                        |
|-----------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-----------------------------------------------|
|                 |                                                                     | <b>C-10:</b> Timely reinstatement following completion of works<br><b>C-11:</b> Permitting of discharges<br><b>C-12:</b> Discharge outfall design                                                                                                                                                                                                                                                                                                            |             |                     |                                               |
|                 | Increases in flow in watercourses due to dewatering of excavations. | <b>Construction - general:</b><br><b>C-1:</b> A Code of Construction Practice (CoCP)<br><b>Construction - water and silt management:</b><br><b>C-2:</b> Drainage and Water Management Plan (DWMP)<br><b>C-3:</b> Timing of works<br><b>C-7:</b> Management of dewatering of excavations<br><b>C-11:</b> Permitting of discharges<br><b>C-12:</b> Discharge outfall design<br><b>Construction - flood risk:</b><br><b>C-23:</b> Flood Emergency Response Plan | Low – High  | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

## Operational phase

- 7.10.28.2 Working areas would be restored, including removal of temporary construction access and reinstatement of existing agricultural drainage networks, once construction is completed. During the operational phase of the Project, all pipelines would be underground, and the only significant surface infrastructure would be at HAGIs and Block Valves.
- 7.10.29 Requirements for inspection, maintenance and refurbishment during the operational phase of the Project are expected to be limited, as discussed in **Section 2.6**. The pipelines would be installed with corrosion protection and it is considered that their operation would largely be maintenance free, although regular internal and external inspection would be carried out. Internal inspection would be carried out via 'pigging' from HAGIs, whereas routine external inspections are typically carried out remotely, without the need for access across private land. Infrequent pipeline walkover surveys (every 2-7 years) would be carried out on foot.
- 7.10.30 The HAGIs and Block Valves would not be permanently staffed, and would typically be monitored remotely using CCTV. Inspection and minor servicing may be required for the electrical plant, but it is anticipated that the HAGIs and Block Valves would require minimal scheduled operation and maintenance activities. As noted above, the inspection of the pipelines would be undertaken internally from the inspection facilities at HAGIs.
- 7.10.31 Given the minimal nature of the maintenance works, it is anticipated that the only water environment effects arising from the operational phase of the Project would be associated with the presence of the infrastructure. The pipelines have the potential to affect groundwater levels and subsurface flow pathways in their vicinity. Channel morphology and fluvial geomorphological processes could be affected at pipeline watercourse crossings, should pipelines become exposed. The above ground infrastructure has the potential to affect surface runoff and infiltration rates, which could affect groundwater recharge and surface water flood risk to external receptors. Depending on location, the above ground infrastructure could, itself, be at risk of flooding from external sources. As noted in **Section 7.8.17 (Table 7.18)**, flow regime effects on surface water bodies and all water quality effects are scoped out of the assessment for the operational phase.
- 7.10.32 **Table 7.23** summarises the preliminary assessment of water environment effects associated with the operation and maintenance of the Project. For the purposes of this preliminary assessment, all receptors have been considered together in generic groups. The range of the value, magnitude and significance definitions for each potential effect are given within **Table 7.19**, **Table 7.20** and **Table 7.21** respectively. The magnitude, and the significance, of effects have been assessed on the assumption that the embedded environmental measures listed in **Table 7.15** are effectively implemented. On the basis of these measures being successfully implemented there would be no material difference in the predicted magnitude and significance of effect assessed between the different pipeline corridor routing options and/or between the different HAGI and Block Valve locations as summarised at the start of **Section 7.6**.

### *Aquatic Environment and Water Resources.*

- 7.10.33 Any change in groundwater levels arising from subsurface obstructions to groundwater flow, i.e. pipeline and/or HAGI sub-surface foundations are likely to be minimal given the relatively shallow depth of most excavations compared to the deeper WFD water bodies and aquifers. The current status of WFD groundwater bodies is “Poor”, giving a Medium sensitivity for these receptors. Effects are expected to be greater within shallow groundwater bodies but, given the scale of the obstructions, most effects are likely to be Negligible. Where necessary, appropriate mitigation would be provided (see **Table 7.15**, measure ID D5: Management of subsurface flow pathways). This effect is therefore likely to be Negligible (**Not Significant**) (**Table 7.23**). Given this effect is evaluated to be of Negligible significance, it also follows that any effects on designated conservation sites or abstractions that are groundwater dependent would also be Negligible.
- 7.10.34 An objective of pipeline design is to ensure that pipelines are located at sufficient depth below the bed of watercourses to ensure they do not become exposed over the lifetime of the development. This will certainly be the case for all of the major trenchless crossings, where the possibility of operational phase morphological effects can be ruled out, given that crossings would be at significant depth below channel bed level (for instance, expected to be around 15m for HDD). Open cut crossings would be shallower, but given that these would be crossings of smaller watercourses, and that most of the Preliminary Order Limits are low-lying with low-gradient and/or low-energy watercourses, the risk of pipeline exposure is considered to be Negligible. Nevertheless, these risks would be considered on a case by case basis during preparation of the WCP, which would be prepared to support the CoCP during the detailed design stage of the Project (see **Table 7.15**, measure ID C-25: Watercourse Crossing Plan). Consequently, changes to watercourse morphology and geomorphological processes due to pipeline exposure and/or the need to retrofit erosion protection around pipeline crossings during the operational phase are considered to be Negligible and therefore the effect to be Negligible (**Not Significant**) (**Table 7.23**).

### *Flood Risk*

- 7.10.35 Flood risk receptors include the elements of the permanent above-ground infrastructure associated with the Project (principally HAGIs and Block Valves) as well as external (non-Project) receptors in their vicinity. At this stage it is not possible to identify every specific receptor. Taking a precautionary approach, it has been assumed that receptor sensitivity ranges from Low to High for this preliminary assessment.
- 7.10.36 The buried pipeline is considered to be resilient to the risk of flooding, and consequently the risk of flooding to the pipeline is not considered further. However, it has the potential to increase flood risk to external receptors through the disruption of shallow subsurface flows in areas where the groundwater table is close to the surface. These risks would be mitigated through preferential siting, appropriate alignment, cross drainage and the appropriate placing of clay water

barriers/mitigation as appropriate. With these measures in place effects on receptors are likely to be Negligible (**Not Significant**).

- 7.10.37 The risk of flooding to HAGI and Block Valves would be mitigated through preferential siting and, where necessary, through the development of specific flood protection measures. As noted in the preliminary FRA in **Appendix 7B**, an initial screening exercise has identified four HAGI locations where additional measures to protect the site against fluvial or tidal flooding may be necessary (Higher Walton, Rocksavage, HPP and Hydrogen Storage Facility). Where flood protection measures are required, compensatory storage would be provided to ensure that there is no increase in flood risk to external receptors as a result of flood water displacement. Residual flood risks would be managed through the preparation of an operational FERP. Further, detailed assessment would be carried out to support the DCO FRA to develop the details of the required flood protection measures. Nevertheless, with these measures in place, any operational phase tidal or fluvial flood risk effects on project infrastructure (HAGIs and Block Valves) and external receptors are likely to be Minor to Negligible (**Not Significant**).
- 7.10.38 Landform changes and new impermeable surfaces at HAGI and Block Valve compounds could increase surface runoff rates and overland flow pathways, which could increase flood risk to external receptors in their vicinity. This would be mitigated through the implementation of appropriate drainage systems including SuDS. Drainage Strategies would be produced for all HAGI and Block Valve locations as part of the DCO FRA to demonstrate how these would be implemented. Nevertheless, with SuDS and drainage strategy measures in place, any effect on receptors due to the increase in surface water run-off are likely to be Negligible (**Not Significant**).
- 7.10.39 Inspection and maintenance of project flood protection and drainage measures would be carried out throughout the operational phase, in order to secure their continued effectiveness.

Table 7.23 Residual effects during the operation and maintenance phase

| Receptor groups                                                | Activity and potential effect                                                                                                                                                                                                                     | Embedded environmental measures                                                                                                                             | Value      | Magnitude of effect | Significance of effect                |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|---------------------------------------|
| <b>Aquatic Environment</b>                                     |                                                                                                                                                                                                                                                   |                                                                                                                                                             |            |                     |                                       |
| <b>Groundwater WFD Water bodies</b>                            | A change in groundwater levels arising from subsurface obstructions to groundwater flow, i.e. pipeline and/or HAGI and Block Valve sub-surface foundations.                                                                                       | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>D-5:</b> Management of subsurface flow pathways                                         | Medium     | Negligible          | Negligible ( <b>Not Significant</b> ) |
| <b>Surface Water WFD Water bodies (River and Transitional)</b> | Changes to watercourse morphology and geomorphological processes due to possible pipeline exposure at watercourse crossings.                                                                                                                      | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><br><b>Construction – watercourse crossings:</b><br><b>C-25:</b> Watercourse crossing plan | Medium     | Negligible          | Negligible ( <b>Not Significant</b> ) |
| <b>Conservation Sites</b>                                      | Reduction of water availability to support existing groundwater or surface water designated or undesignated sites, ecosystems and features as a consequence of changes in groundwater levels and flows arising from the presence of the pipeline. | <b>Overall design:</b><br><b>D-2:</b> Optimisation of routing<br><b>D-5:</b> Management of subsurface flow pathway                                          | High - Low | Negligible          | Negligible ( <b>Not Significant</b> ) |

| Receptor groups                               | Activity and potential effect                                                                                                                                                   | Embedded environmental measures                                                                | Value      | Magnitude of effect | Significance of effect               |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------|---------------------|--------------------------------------|
| Water Resources                               |                                                                                                                                                                                 |                                                                                                |            |                     |                                      |
| Licensed abstractions – public water supplies | Reduction of water availability to support existing surface water and groundwater abstractions as a consequence of changes in groundwater levels and flows around the pipeline. | Overall design:<br>D-2: Optimisation of routing<br>D-5: Management of subsurface flow pathways | Medium     | Negligible          | Negligible (Not Significant)         |
| Other (non-public) abstractions               |                                                                                                                                                                                 |                                                                                                | Low        | Low - Negligible    | Minor - Negligible (Not Significant) |
| Flood Risk                                    |                                                                                                                                                                                 |                                                                                                |            |                     |                                      |
| Flood Risk Receptors                          | Groundwater flood risk associated with presence of buried pipeline.                                                                                                             | Overall design:<br>D-2: Optimisation of routing<br>D-5: Management of subsurface flow pathways | Low – High | Negligible          | Negligible - Minor (Not Significant) |
|                                               | Fluvial or tidal flood risk as a result of HAGIs or Block Valves needing to be in high risk areas. Risks to Project infrastructure and increased risk to external receptors.    | Overall design:<br>D-1: Underground pipeline                                                   | Low – High | Negligible          | Negligible - Minor (Not Significant) |

| Receptor groups | Activity and potential effect                                                                                                       | Embedded environmental measures                                                                                                                                                                       | Value      | Magnitude of effect | Significance of effect                        |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|-----------------------------------------------|
|                 |                                                                                                                                     | <b>D-2:</b> Optimisation of routing<br><b>D-3:</b> Development of flood protection and drainage measures<br><b>O-1:</b> Periodic inspection and maintenance of flood protection and drainage measures |            |                     |                                               |
|                 | Changes in flow pathways and runoff rates associated with changed ground levels and impermeable surfaces at HAGIs and Block Valves. | <b>Overall design:</b><br><b>D-3:</b> Development of flood protection and drainage measures<br><b>O-1:</b> Periodic inspection and maintenance of flood protection and drainage measures              | Low – High | Negligible          | Negligible - Minor ( <b>Not Significant</b> ) |

## Decommissioning phase

- 7.10.40 Proposals for decommissioning of the Project at the end of its operating life are described in **Section 2.7**. In summary, it is likely that the buried pipeline would be left in-situ to avoid any environment effects associated with its removal, but that sections at crossings (including of watercourses) would be grouted. At HAGIs and Block Valves, all above ground infrastructure would be removed, residual subsurface pipework would be capped and backfilled, and the surface restored or prepared for redevelopment.
- 7.10.41 As a consequence, decommissioning effects are likely similar to construction effects, but of a lesser magnitude and spatial extent, given that subsurface infrastructure would be left in-situ. On the basis that the assessment presented in **Section 7.10** concluded that construction effects can be satisfactorily mitigated on the basis of the proposed embedded measures, we would also expect to reach the same conclusion for decommissioning phase effects. However, these would need to be subject to full assessment at the appropriate time, when detailed decommissioning proposals are put forward, and in the context of the environment baseline and regulatory context prevailing at that time.

## 7.11 Preliminary Significance Conclusions

- 7.11.1 A summary of the results of the preliminary the water environment assessment is provided in **Table 7.24**.

Table 7.24 Preliminary summary of significance of effects

| Receptor and summary of predicted effects                                                                                                                                                                              | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction</b>                                                                                                                                                                                                    |                                                         |                                  |                                               |                                                                                                                                                                                                                                      |
| <i><b>Aquatic Environment</b></i>                                                                                                                                                                                      |                                                         |                                  |                                               |                                                                                                                                                                                                                                      |
| <b>Groundwater WFD Water bodies</b> <ul style="list-style-type: none"> <li>change in groundwater level and flow.</li> </ul>                                                                                            | Medium                                                  | Negligible – Low                 | Negligible – Minor ( <b>Not Significant</b> ) | Overall design and management of subsurface flow pathways. Limited period of time of and scale of construction, i.e. depth of excavations.                                                                                           |
| <b>Groundwater and Surface Water WFD Water bodies (River, Transitional and Coastal)</b> <ul style="list-style-type: none"> <li>potential for accidental contamination entering groundwater or watercourses.</li> </ul> | Medium                                                  | Negligible                       | Negligible ( <b>Not Significant</b> )         | Implementation of a CoCP and associated PPP, DWMP, MMP and WCP. Specific mitigation defined for trenched crossings at watercourse crossing locations. Specific risk assessments and mitigation strategy developed where appropriate. |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                                                   | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Surface Water WFD Water bodies (River, Transitional and Coastal)</b> <ul style="list-style-type: none"> <li>• changes to watercourse morphology;</li> <li>• ingress of silt laden runoff and associated nutrients</li> <li>• increased nutrient load from disposal of construction phase foul sewage arisings</li> </ul> | Medium                                                  | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | <p>Overall design of subsurface infrastructure. Limited period of time of and scale of construction, i.e. depth of excavations. Implementation of a CoCP, DWMP, MMP and WCP.</p> <p>Provision of appropriate sewage treatment with discharge subject to environment permit, if not tankered offsite or discharged to foul sewer.</p> |
| <b>Conservation Sites</b> <ul style="list-style-type: none"> <li>• Reduction of water availability to support existing groundwater or surface water designated sites/ impacts of elevated silt/</li> </ul>                                                                                                                  | Medium                                                  | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | <p>Implementation of a CoCP and associated PPP, DWMP, MMP and WCP. Distance of designated sites from the proposed works (dilution effects).</p>                                                                                                                                                                                      |

| Receptor and summary of predicted effects                                                                                                                                                                                       | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| nutrient/ contaminant inputs during construction                                                                                                                                                                                |                                                         |                                  |                                               |                                                                                                                                                                                                                                                                |
| <b>Water Resources</b>                                                                                                                                                                                                          |                                                         |                                  |                                               |                                                                                                                                                                                                                                                                |
| <b>Licensed abstractions –public water supplies</b> <ul style="list-style-type: none"> <li>Reduction of water availability to support existing surface water and groundwater abstractions (quantity and/ or quality)</li> </ul> | Medium                                                  | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | Implementation of a CoCP and associated PPP, DWMP, MMP and WCP. Specific mitigation defined for trenched crossings at watercourse crossing locations. Specific risk assessments and mitigation strategy developed where appropriate, particularly within SPZs. |
| <b>Other (non-public) licensed abstractions</b> <ul style="list-style-type: none"> <li>Reduction of water availability to support existing surface water and</li> </ul>                                                         | Low                                                     | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | Abstraction sensitivity based on available resource. Implementation of a CoCP and associated PPP, DWMP, MMP and WCP. Specific mitigation                                                                                                                       |

| Receptor and summary of predicted effects                                                                                                           | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| groundwater abstractions (quantity and/ or quality)                                                                                                 |                                                         |                                  |                                               | defined for trenched crossings at watercourse crossing locations. Specific risk assessments and mitigation strategy developed where appropriate.                                   |
| <b>Consented discharges</b> <ul style="list-style-type: none"> <li>Physical disruption to existing discharge</li> </ul>                             | Low                                                     | Low - Negligible                 | Minor - Negligible ( <b>Not Significant</b> ) | Design and optimisation of routing. Embedded measures, particularly through micro-siting of construction activities and infrastructure. Implementation of a CoCP.                  |
| <b>Flood Risk Receptors</b>                                                                                                                         |                                                         |                                  |                                               |                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Positioning of temporary stockpiles, compounds, equipment and staff in areas of known flood risk;</li> </ul> | Low – High                                              | Negligible                       | Negligible - Minor ( <b>Not Significant</b> ) | Design and optimisation of routing. Embedded measures, particularly through preferential siting of construction activities and infrastructure, minimising raised structures in the |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                                                                                                                                                  | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup> | Summary rationale                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Volumetric displacement of flood water or interruption of surface water pathways associated with the construction of temporary stockpiles, infrastructure and raised access tracks within floodplain areas;</li> <li>• Changes in watercourse conveyance associated with temporary watercourse crossings;</li> <li>• Changes in watercourse conveyance associated with</li> </ul> |                                                         |                                  |                           | <p>floodplain, stand off distances from watercourses. Implementation of a CoCP and DWDP, and a FERP if required.</p> |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                                                            | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup> | Summary rationale |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|---------------------------|-------------------|
| <p>pipeline crossings;</p> <ul style="list-style-type: none"> <li>Changes in runoff rates and new flow pathways associated with ground disturbance and the development of temporary access tracks and temporary construction compound areas;</li> <li>Increases in flow in watercourses due to dewatering of excavations.</li> </ul> |                                                         |                                  |                           |                   |
| <b>Operations and Maintenance</b>                                                                                                                                                                                                                                                                                                    |                                                         |                                  |                           |                   |
| <b><i>Aquatic Environment</i></b>                                                                                                                                                                                                                                                                                                    |                                                         |                                  |                           |                   |

| Receptor and summary of predicted effects                                                                                                                                                                                                     | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|------------------------------------------------------------|
| <b>Groundwater WFD Water bodies</b> <ul style="list-style-type: none"> <li>A change in groundwater levels arising from subsurface obstructions to groundwater flow, i.e. pipeline and/or HAGI sub-surface foundations.</li> </ul>             | Medium                                                  | Negligible – Low                 | Negligible – Minor ( <b>Not Significant</b> ) | Overall design and management of subsurface flow pathways. |
| <b>Surface Water WFD Water bodies (River and Transitional)</b> <ul style="list-style-type: none"> <li>Changes to watercourse morphology and geomorphological processes due to possible pipeline exposure at watercourse crossings.</li> </ul> | Medium                                                  | Negligible                       | Negligible ( <b>Not Significant</b> )         | Overall design and implementation of WCP.                  |
| <b>Conservation Sites</b>                                                                                                                                                                                                                     |                                                         |                                  |                                               |                                                            |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                           | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Reduction of water availability to support existing groundwater or surface water designated or undesignated sites, ecosystems and features as a consequence of changes in groundwater levels and flows arising from the presence of the pipeline.</li> </ul> | Medium                                                  | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | Overall design and management of subsurface flow pathways. |
| <b>Water Resources</b>                                                                                                                                                                                                                                                                              |                                                         |                                  |                                               |                                                            |
| <b>Licensed abstractions –public water supplies</b> <ul style="list-style-type: none"> <li>Reduction of water availability to support existing surface water and</li> </ul>                                                                                                                         | Medium                                                  | Negligible - Low                 | Negligible - Minor ( <b>Not Significant</b> ) | Overall design and management of subsurface flow pathways. |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                         | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|------------------------------------------------------------|
| groundwater abstractions as a consequence of changes in groundwater levels and flows around the pipeline.                                                                                                                                                                         |                                                         |                                  |                                               |                                                            |
| <b>Other (non-public) licensed abstractions</b> <ul style="list-style-type: none"> <li>Reduction of water availability to support existing surface water and groundwater abstractions as a consequence of changes in groundwater levels and flows around the pipeline.</li> </ul> | Low                                                     | Low -Negligible                  | Minor - Negligible ( <b>Not Significant</b> ) | Overall design and management of subsurface flow pathways. |
| <b>Flood Risk</b>                                                                                                                                                                                                                                                                 |                                                         |                                  |                                               |                                                            |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                                                                                                                                                                                         | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup>                     | Summary rationale                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Flood Risk Receptors</b> <ul style="list-style-type: none"> <li>Groundwater flood risk associated with presence of buried pipeline;</li> <li>Fluvial or tidal flood risk as a result of HAGIs or Block Valves needing to be in high risk areas (risks to project infrastructure and increased risk to external receptors); and</li> <li>Changes in flow pathways and runoff rates associated with changed ground levels and impermeable surfaces at</li> </ul> | Low                                                     | Negligible                       | Minor - Negligible ( <b>Not Significant</b> ) | Design and optimisation of routing. Management of sub-surface pathways and development of flood protection and drainage measures. |

| Receptor and summary of predicted effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Sensitivity/ importance/ value of receptor <sup>1</sup> | Magnitude of change <sup>2</sup> | Significance <sup>3</sup> | Summary rationale |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|---------------------------|-------------------|
| HAGIs and Block Valves.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |                                  |                           |                   |
| <ol style="list-style-type: none"><li>1. The sensitivity/importance/value of a receptor is defined using the criteria set out in <b>Section 7.9</b> and is defined as very low, low, medium and high.</li><li>2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in <b>Section 7.9</b> and is defined as negligible, low, medium and high.</li><li>3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (potentially significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in <b>Section 7.9</b>.</li></ol> |                                                         |                                  |                           |                   |

## 7.12 Further Work to be Undertaken

- 7.12.1 The information provided in this PEIR is preliminary, the final assessment of likely significant effects will be reported in the ES. This section describes the further work to be undertaken to support the water environment assessment presented in the ES.

### Baseline

- 7.12.2 Further work to be undertaken related to the final ES baseline is as follows:
- undertake site visits to areas of particular interest to inform further, detailed assessment for ES and FRA during late summer or early autumn 2022;
  - use information from the GI works to inform the baseline and help develop a better conceptual understanding of pathways and vulnerability to groundwater receptors; and
  - the acquisition of further information on sensitive watercourses for fish/ eel spawning and migration.

### Assessment

- 7.12.3 Further work to be undertaken related to the final ES assessment is as follows:
- flood risk modelling for the detailed assessment of flood risk at three HAGI locations (Higher Walton, Rocksavage and HPP) and further flood risk analysis at one HAGI location (Inovyn HSF);
  - further screening and detailed sites-specific appraisal of potential effects for key public water groundwater abstraction supplies; and
  - assessment of impacts to fish/eel habitat/migration, morphology and flood risk at watercourse crossing locations.
- 7.12.4 A cumulative effects assessment (CEA) will be undertaken for the Project which considers the combined impacts with other developments on the same single receptor or resource (inter-project effects). The detailed method to be followed in identifying and assessing potential cumulative effects is set out in **Section 3.9 of Chapter 3: Approach to Preparing the PEIR**.
- 7.12.1 For the water environment, the Study Area identified in **Section 7.4** will be applied for the CEA to ensure direct and indirect cumulative effects can be appropriately identified and assessed. A long list and proposed short list of other developments that may interact with the water environment within the Project during their construction, operation or decommissioning is presented in **Appendix 3B**. Only those developments currently identified in the list that fall within the water environment Study Area have the potential to result in cumulative effects with the Project either through introduction of additional constraints on the water environment, in terms of water quality or quantity and/or flood risk. Therefore, all developments falling outside the water environment

Study Area would be excluded from the CEA assessment for the water environment.

- 7.12.2 UK legislation and planning policy requires all developments to be suitable for their proposed use in which risks to the water environment have been appropriately managed. Planning policy takes into account how new development could affect existing developments in terms of flood risk, water supply and the water environment. The majority of 'other developments' will, therefore, have been approved, (or it has been assumed that they would be approved) in line with UK legislation and planning policy, with conditions requiring environmental water environment measures to be adopted prior to commencement of construction activities, and ensuring no increase in flood risk as a result of new, permanent development.
- 7.12.3 On this basis, it is considered that successful implementation of such conditions and any embedded, standard good industry practice measures would offset any potential significant effects identified as part of other developments. There are not therefore considered to be any likely impacts from the Project that have the potential to act cumulatively with similar impacts from the 'other developments' to contribute to cumulative water environment effects. This will however be revisited for the ES following confirmation of the short list of other developments to be considered.

## Environmental measures

7.12.3.1 Further work to be undertaken related to environmental measures is as follows:

- liaison with the design team to optimise the siting of operational and construction infrastructure outside of areas of known flood risk;
- development of flood protection measures for HAGIs at fluvial or tidal flood risk;
- development of drainage strategies for permanent above ground infrastructure and an outline Drainage and Water Management Plan for construction;
- definition of requirements for subsurface water management around the pipeline trench, for excavations for construction and for pipeline backfill during operations, particularly in the vicinity of key public water supply abstractions; and
- define the specific requirements for further mitigation at watercourse crossings for sensitive locations.

# Glossary of Terms and Abbreviations

| Term           | Definition                                |
|----------------|-------------------------------------------|
| <b>ASStGWF</b> | Areas Susceptible to Groundwater Flooding |
| <b>AWB</b>     | Artificial Water Body                     |
| <b>BGS</b>     | British Geological Survey                 |
| <b>CEA</b>     | Cumulative Effects Assessment             |
| <b>CEC</b>     | Cheshire East Council                     |
| <b>CEH</b>     | Centre for Ecology and Hydrology          |
| <b>CO</b>      | Conservation Objective                    |
| <b>CoCP</b>    | Code of Construction Practice             |
| <b>CWCC</b>    | Cheshire West and Chester Council         |
| <b>DCO</b>     | Development Consent Order                 |
| <b>DWMP</b>    | Drainage and Water Management Plan        |
| <b>EIA</b>     | Environmental Impact Assessment           |
| <b>ES</b>      | Environmental Statement                   |
| <b>FERP</b>    | Flood Emergency Response Plan             |
| <b>FRA</b>     | Flood Risk Assessment                     |
| <b>FRAP</b>    | Flood Risk Activities Permit              |
| <b>GI</b>      | Ground Investigation                      |
| <b>GPP</b>     | Guidance for Pollution Prevention         |
| <b>HAGI</b>    | Hydrogen Above Ground Installation        |
| <b>HDD</b>     | Horizontal Directional Drilling           |
| <b>HMWB</b>    | Heavily Modified Water Body               |
| <b>IBC</b>     | Intermediate Bulk Containers              |
| <b>IDB</b>     | Internal Drainage Board                   |
| <b>LGS</b>     | Local Geological Sites                    |

| Term              | Definition                                                                                                  |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| <b>LLFA</b>       | Lead Local Flood Authority                                                                                  |
| <b>LNR</b>        | Local Nature Reserve                                                                                        |
| <b>LWS</b>        | Local Wildlife Site                                                                                         |
| <b>Met Office</b> | Meteorological Office                                                                                       |
| <b>MMO</b>        | Marine Management Organisation                                                                              |
| <b>MMP</b>        | Materials Management Plan                                                                                   |
| <b>NGR</b>        | National Grid Reference                                                                                     |
| <b>NNR</b>        | National Nature Reserve                                                                                     |
| <b>NPPF</b>       | National Planning Policy Framework                                                                          |
| <b>NPS</b>        | National Policy Statement                                                                                   |
| <b>NRFA</b>       | National River Flow Archive                                                                                 |
| <b>OS</b>         | Ordnance Survey                                                                                             |
| <b>OWC</b>        | Ordinary Watercourse Consent                                                                                |
| <b>PEIR</b>       | Preliminary Environmental Information Report                                                                |
| <b>PFRA</b>       | Preliminary Flood Risk Assessment (as prepared by LLFAs in accordance with the Flood Risk Regulations 2009) |
| <b>pFRA</b>       | Appendix 7B: Preliminary Flood Risk Assessment, as prepared to support the PEIR for the Project             |
| <b>PPG</b>        | Planning Policy Guidance                                                                                    |
| <b>PPGs</b>       | Pollution Prevention Guidance                                                                               |
| <b>PPP</b>        | Pollution Prevention Plan                                                                                   |
| <b>PWS</b>        | Private Water Supply                                                                                        |
| <b>RBMP</b>       | River Basin Management Plan                                                                                 |
| <b>SAC</b>        | Special Areas of Conservation                                                                               |
| <b>SFRA</b>       | Strategic Flood Risk Assessment                                                                             |
| <b>SPA</b>        | Special Protection Area                                                                                     |
| <b>SPZ</b>        | Source Protection Zones                                                                                     |

| Term | Definition                  |
|------|-----------------------------|
| SuDS | Sustainable Drainage System |
| UU   | United Utilities            |
| WCP  | Watercourse Crossing Plan   |
| WFD  | Water Framework Directive   |
| WWTW | Wastewater Treatment Works  |
| ZoI  | Zone of Influence           |

# HyNet North West Hydrogen Pipeline

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