Frodsham Solar

Environmental Statement: Volume 1
Chapter 9: Flood Risk and Surface Water

May 2025

Cubico
SUSTAINABLE INVESTMENTS

PINS Ref: EN010153
Document Ref: EN010153/DR/6.1
Planning Act 2008; and Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations Regulation 5(2)(a)

Revision P01

Document Control

Revision	Date	Prepared By	Reviewed / Approved By
P01	23/05/2025	Megan Williams BSc (Hons) MSc MCIWEM	Aled Williams BSc (Hons) MCIWEM C.WEM

Prepared For:
Frodsham Solar Ltd

Prepared By:

Well House Barns, Chester Road, Bretton, Chester, CH4 0DH
1st Floor, Barfield House, Alderley Road, Wilmslow, SK9 1PL
Maling Exchange, Studio 307, Hoults Yard, Walker Road, Newcastle Upon Tyne, NE6 2HL

T: 0344 8700 007
enquiries@axis.co.uk
www.axis.co.uk

CONTENTS

IMAGES

TABLE

APPENDICES

9.0 FLOOD RISK AND SURFACE WATER

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) presents the findings of an assessment of the likely significant effects on flood risk, drainage and surface water quality as a result of the Proposed Development.

9.1.2 For a detailed description of the Proposed Development, refer to **ES Volume 1 Chapter 2.0: The Proposed Development [EN010153/DR/6.1]**.

9.1.3 This chapter is accompanied by the following appendices:

i) **ES Vol 2 Appendix 9-1: Waterco Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**
ii) **ES Vol 2 Appendix 9-2: Waterco Water Framework Directive Assessment [EN010153/DR/6.2]**
iii) **ES Vol 2 Appendix 9-3: Waterco Hydraulic Modelling Report [EN010153/DR/6.2]**
iv) **ES Vol 2 Appendix 9-4: Waterco Ince and Frodsham Technical Note [EN010153/DR/6.2]**
v) **ES Vol 2 Appendix 9-5: Consultation Responses [EN010153/DR/6.2]**

9.1.4 Reference to the following chapters may help the readers understanding of potential key impact interactions between flood risk and water quality receptors, and other disciplines:

i) **ES Vol 1 Chapter 7: Terrestrial Ecology [EN010153/DR/6.1]**
ii) **ES Vol 1 Chapter 8: Ornithology [EN010153/DR/6.1]**
iii) **Es Vol 1 Chapter 10: Ground Conditions [EN010153/DR/6.1]**

9.1.5 The following sections of this chapter include:

i) a description of relevant legislation, planning policy and guidance which has informed the assessment;
ii) a summary of consultation with stakeholders;
iii) a description of the methodology for the assessment, including details of the study area and the approach to the assessment of effects;
iv) a review of baseline conditions;
v) details of the measures to avoid or reduce environmental effects, including mitigation and design measures that form part of the Proposed Development;
vi) an assessment of the likely significant effects in relation to flood risk, drainage and surface water, for the construction, operation and decommissioning phases of the Proposed Development, taking into account the measures proposed to avoid or reduce effects;
vii) identification of any additional mitigation measures or monitoring required in relation to likely significant effects;
viii) a summary of the residual effects of the Proposed Development from the implementation of any additional mitigation; and
ix) assessment of any cumulative effects with other Proposed Developments.

Summary of Competency

9.1.6 Waterco Ltd are a civil engineering consultancy specialising in water, drainage and flood protection. Established in 1992, Waterco are experts in Flood Risk Assessments, Drainage Strategies and Water Framework Directive Compliance Assessment.

9.1.7 This chapter has been prepared Miss Megan Williams BSc (Hons) MSc who is a member of the Chartered Institution of Water and Environmental Management (CIWEM). This chapter has also been prepared and checked by Mr Aled Williams BSc (Hons) who is a chartered member of CIWEM (C.WEM). Megan Williams and Aled Williams have a combined 18 years' experience in preparation of Flood Risk Assessments, Drainage Strategies,

Water Framework Directive Compliance Assessments and other associated environmental assessments.

9.2 Legislation, Policy and Guidance

Legislation

9.2.1 This ES chapter has been prepared with reference to the following legislation which relates to flood risk, drainage and surface water quality.

Water Framework Directive 2000/60/EC

9.2.2 Published in December 2000, the Directive aims to preserve, restore and improve the water environment. It is a legal requirement within England and Wales, originally transposed into law through the Water Environment (Water Framework Directive) (England and Wales) (2003) to record data within River Basin Management Plans. River Basin Planning is managed in six-year cycles.

9.2.3 The environmental objectives of the WFD for surface waters include:

i) Prevent deterioration in the status of all bodies of surface water;
ii) Protect, enhance and restore all bodies of surface water, with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of the Directive (2015);
iii) Protect and enhance all artificial and heavily modified bodies of surface water, with the aim of achieving good ecological potential and good surface water chemical status at the latest 15 years after the date of entry into force of the Directive (2015). There are five classes of rating which are; high, good, moderate, poor or bad. The ecological and chemical status of the waterbody is assessed, and the overall status is reflective of which of these is worst rated; and
iv) Implementation of necessary measures, with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substance

The Water Environment Regulations 2017 (Water Framework Directive) (England and Wales)

9.2.4 The Water Environment Regulations (WER) 2017 (Water Framework Directive) (England and Wales) transpose the Water Framework Directive into UK law.

9.2.5 The WFD protects surface waters including rivers, lakes, transitional waters (referred to in this advice as estuarine waters), coastal waters and groundwater.

9.2.6 The aims of the WER Regulations are:

i) to enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystem
ii) to ensure progressive reduction of groundwater pollution
iii) to reduce water pollution, especially by Priority Substances and Certain Other Pollutants under Annex II of the Environmental Quality Standards Directive 2008/105/EC
iv) to support mitigating the effects of floods and droughts
v) to achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015 (Article 4), or good ecological potential for artificial or heavily modified water bodies
vi) to support sustainable water use

Directive on Environmental Quality Standards (EQSD) 2008/105/EC

9.2.7 This directive establishes the environmental quality standards (EQS) for priority substances and certain other pollutants in surface waters.

9.2.8 Good chemical status is achieved when a water body complies with the EQS for all the priority substances and certain other pollutants listed in the EQSD.

Water Act 2014 and Water Resources Act 1991

9.2.9 This Act governs the control of water abstraction, discharge to water bodies, water impoundment, conservation and drought provision.

Flood and Water Management Act 2010

9.2.10 This Act provides details on the management of risks associated with flooding and coastal erosion.

Environmental Protection Act 1990

9.2.11 This Act provides details for identifying and dealing with waste, emissions, contaminated land and water resources.

The Land Drainage Act 1991

9.2.12 This Act establishes the regulation of ordinary watercourses by Local Authorities and Internal Drainage Boards. It outlines that a watercourse should be maintained by its owner so that the flow of water is not impeded. The riparian owner must not accept the natural flow from upstream but does not need to carry out works to cater for increased flows which may results from works carried out upstream.

Groundwater Directive 2006/118/EC

9.2.13 This directive relates to the protection of groundwater against pollution and deterioration from hazardous substances and non-hazardous pollutants.

The Groundwater (England and Wales) Regulations 2009

9.2.14 This regulation transposes 2006/118/EC into law in England and Wales.

Environmental Permitting (England and Wales) Regulations 2016

9.2.15 This regulation provides a consolidated system of environmental permitting including the discharge of water and groundwater activities.

The Environmental Damage (Prevention and Remediation) (England) Regulations 2017 (as amended)

9.2.16 This regulation aims to prevent and remedy damage to a protected species, natural habitat, a site of special scientific interest, water or land.

National Planning Policy

9.2.17 National level planning policy for NSIPs is set out in a series of National Policy Statements (NPSs). Those of relevance to the Proposed Development are:

i) Overarching NPS for Energy EN-1 (NPS EN-1[i]);
ii) NPS for Renewable Energy Infrastructure (NPS EN-3[ii]); and
iii) NPS for Electricity Networks Infrastructure (NPS EN-5[iii]).

9.2.18 The National Planning Policy Framework (NPPF[iv]), and the accompanying online Planning Practice Guidance (PPG[v]) are also important and relevant considerations.

9.2.19 Relevant policies from the above documents are summarised in **Table 9-1** below. The relative sections have informed baseline assessments and mitigation measures to ensure compliance with policy.

Table 9-1 – Summary of national planning policy

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
NPS EN-1	5.8.5	A robust approach to flood risk management is a vital element of climate change adaptation; the applicant and the Secretary of State should take account of the policy on climate change adaptation in Section 4.10.	The relevant climate change allowances have been considered in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	5.8.7	Where new energy infrastructure is, exceptionally, necessary in flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood.	Areas of the Proposed Development lie in flood risk areas. Section 9.7 and 9.8 this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] assess the risk to development and flood risk elsewhere. The assessment demonstrates that the development has been designed to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It has been designed and constructed to remain operational in times of flood. An outline Flood Warning and Evacuation Plan is provided as an appendix to ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	5.8.9 – 5.8.11	If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied as defined in https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Both elements of the Exception Test will have to be satisfied for development to be consented.	The Sequential Test provided in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] and ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk. As such an Exception Test is provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment and summarised in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] that demonstrates both elements of the Exception Test are satisfied.
	5.8.12	Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques.	The surface water drainage at the Site has been designed to ensure there is no increase in flood risk elsewhere, accounting for effects of climate change. This is addressed in Section 9.7 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] where use of SuDS has been set out. Hydraulic modelling has been undertaken to show there is no increase in fluvial or tidal flood risk elsewhere, ES Vol 2

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
			Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2].
	5.8.13	A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England or Zones B and C in Wales. In Flood Zone 1 in England or Zone A in Wales, an assessment should accompany all proposals involving: • sites of 1 hectare or more • land which has been identified by the EA or NRW as having critical drainage problems • land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future • land that may be subject to other sources of flooding (for example surface water) • where the EA or NRW, Lead Local Flood Authority, Internal Drainage Board or other body have indicated that there may be drainage problems.	A site-specific flood risk assessment has been completed and is provided as ES Volume 2 Appendix 9-1:Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].
	5.8.14	This assessment should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account	All sources of flooding, and the relevant climate change allowances have been assessed in ES Volume 2 Appendix 9-1:Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].
	5.8.15	The minimum requirements for Flood Risk Assessments (FRA) are that they should: • be proportionate to the risk and appropriate to the scale, nature and location of the project; • consider the risk of flooding arising from the project in addition to the risk of flooding to the project; take the impacts of climate change into account, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made; • be undertaken by competent people, as early as possible in the process of preparing the proposal;	All sources of flooding, and the relevant climate change allowances have been addressed in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. Mitigation measures, and safe access and egress are also considered in the report. Hydraulic modelling has been undertaken to quantify fluvial and tidal flooding during a range of flood events and is provided as ES Vol 2 Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2].

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		• consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure and exceedance; • consider the vulnerability of those using the site, including arrangements for safe access and escape; • consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration; • identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management; • consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes; • include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding; consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems. Information should include:	Greenfield runoff rates, discharge location (in accordance with the drainage hierarchy) and the use of SuDS are also addressed in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. The surface water drainage at the Site has been designed to ensure there is no increase in flood risk elsewhere, accounting for effects of climate change.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		i) Describe the existing surface water drainage arrangements for the site ii) Set out (approximately) the existing rates and volumes of surface water run-off generated by the site. Detail the proposals for restricting discharge rates iii) Set out proposals for managing and discharging surface water from the site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate iv) Demonstrate how the hierarchy of drainage options has been followed. v) Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate. vi) Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the site vii) Describe the multifunctional benefits the sustainable drainage system will provide viii. Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system	

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		viii) Explain how run-off from the completed development will be prevented from causing an impact elsewhere ix) Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development; • detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere; • identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction; and • be supported by appropriate data and information, including historical information on previous events.	
	5.8.17	Development (including construction works) will need to account for any existing watercourses and flood and coastal erosion risk management structures or features, or any land likely to be needed for future structures or features so as to ensure: • Access, clearances and sufficient land are retained to enable their maintenance, repair, operation, and replacement, as necessary • Their standard of protection is not reduced • Their condition or structural integrity is not reduced	All watercourses (Ordinary Watercourses and Main Rivers) within and adjacent to the Site are identified within ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. Maintenance access buffer strips to watercourses and flood defences are provided as 8m from ordinary watercourses and main rivers within the Site and 16m from the River Weaver and its associated flood defences.
	5.8.18	Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the NSIP process with the EA or	A number of meetings have been held with the EA to discuss parameters of the Flood Risk Assessment. Modelling

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		NRW, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators	parameters and design events have been agreed with the EA through a paid pre-application process. Details of the consultation process is provided in Section 9.4 of this ES Chapter.
	5.8.19	Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. The Secretary of State should advise applicants to undertake these steps where they appear necessary but have not yet been addressed.	A number of meetings have been held with the EA to discuss parameters of the Flood Risk Assessment. Modelling parameters and design events agreed with the EA through a paid pre-application process. Details of the consultation process is provided in Section 9.4 of this ES Chapter.
	5.8.20	If the EA, NRW or another flood risk management authority has reasonable concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the EA or NRW and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the authority's concerns.	A number of meetings have been held with the EA to discuss parameters of the Flood Risk Assessment. Modelling parameters and design events agreed with the EA through a paid pre-application process. Details of the consultation process is provided in Section 9.4 of this ES Chapter.
	5.8.21	The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.	A Sequential Test provided in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] and ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that there are no reasonable available sites (taking into account wider sustainable development objectives in areas of lower flood risk within which the Proposed Development could be located.
	5.8.23	Consideration of alternative sites should take account of the policy on alternatives set out in Section 4.3 above. All projects	The consideration of alternative sites is addressed in ES Volume 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2]

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		should apply the Sequential Test to locating development within the site	
	5.8.24	To satisfactorily manage flood risk, arrangements are required to manage surface water and the impact of the natural water cycle on people and property	This is addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. The surface water drainage at the Site has been designed to ensure there is no increase in flood risk elsewhere, accounting for effects of climate change.
	5.8.26	Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts	No ground modification is proposed, and the existing runoff / overland flow regime will not change. In the event of a drainage system exceedance (applicable to the BESS and substation drainage systems), flooding would be controlled in the form of shallow depth above ground flooding within the BESS and substation compounds. This is addressed in detail in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].
	5.8.27	The surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect.	Attenuation is provided for the 1 in 100 year plus 45% Climate Change event. Discharge will be made at a limited greenfield runoff rate ensuring peak flow rates of surface water leaving the Site are no greater than as per the existing scenario. This is addressed in detail in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1:Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	5.8.29	The sequential approach should be applied to the layout and design of the project. Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses. Opportunities should be taken to lower flood	A sequential approach has been taken within the design of the Site layout with the most sensitive equipment located outside of the Flood Zone 2 and 3 extents and the panels designed to be at a height to avoid flooding. This is addressed in detail in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] and

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		risk by reducing the built footprint of previously developed sites and using SuDS.	ES Vol 1 Chapter 3: Alternatives and Design Evolution [EN010153/DR/6.1]
	5.8.30	Where a development may result in an increase in flood risk elsewhere through the loss of flood storage, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided.	N/A. Detailed modelling has demonstrated that flood compensation is not required.
	5.8.31	Where it is not possible to provide compensatory storage on site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked. Where development may cause the deflection or constriction of flood flow routes, these will need to be safely managed within the site.	N/A. Detailed modelling has demonstrated that flood compensation is not required.
	5.8.33	The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding.	A Flood Warning and Evacuation Plan (FWEP) has been prepared and sets out how to prepare for and respond to a flood event. This is included as part of ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	5.8.34	The applicant should take advice from the local authority emergency planning team, emergency services and, where appropriate, from the local resilience forum when producing an evacuation plan for a manned energy project as part of the FRA. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the FRA.	Flood warning and evacuation procedures have been set out in the FWEP which is included as part of the ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	5.8.35	Flood resistant and resilient materials and design should be adopted to minimise damage and speed recovery in the event of a flood	Flood resistant and resilient materials and design are addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. All equipment susceptible to flood damage will be raised above the design flood level.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	5.16.3	Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the ES or equivalent (see Section 4.3 and 4.10).	Baseline information and potential impacts of the development on the physical and chemical characteristics of the water environment is addressed in ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2].
	5.16.4	The applicant should make early contact with the relevant regulators, including the local authority, the Environment Agency and Marine Management Organisation, where appropriate, for relevant licensing and environmental permitting requirements	This is addressed in Section 9.4 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	5.16.5	Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation	Measures for the treatment of surface runoff during both the construction and operational phase are included in Section 9.8 of this ES Chapter, ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] and ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2].
	5.16.6	Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in River Basin Management Plans and Groundwater Protection Zones – this could include, for example, the use of protective barriers.	The base of the permeable stone surfacing in the BESS will be lined with an impermeable geotextile as a precautionary measure to prevent firewater polluting shallow groundwater. Further details on protective measures are included in Section 9.8 of this ES Chapter, ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2], ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2] and the outline Construction Environmental Management Plan (oCEMP) [EN010153/DR/7.5].
	5.16.7	The ES should in particular describe:	The baseline information of waters affected by the proposed project is provided in ES Volume 2 Appendix 9-2: Water

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics • any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions • how climate change could impact any of the above in the future • any cumulative effects	Framework Directive Assessment [EN010153/DR/6.2]. No new abstractions or changes to abstraction rates are proposed. Details on future baseline is included within Section 9.7 of this ES Chapter and cumulative effects are Section 9.12.
	5.16.9	The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked.	Pollution control measures are addressed within Section 9.8 of this ES Chapter, ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2] as well as the outline Construction Environmental Management Plan (oCEMP) [EN010153/DR/7.5].

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	5.16.10	The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If a development needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA or NRW.	N/A
NPS EN-3	2.10.84	Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant.	The solar PV panels will not result in an increase in the surface water runoff rates and will therefore not impact the existing drainage regime. A formal drainage system is proposed for the BESS compound and substation and will ensure no increase in surface water discharge from the Site. A Flood Risk Assessment and Drainage Strategy has been completed and is provided as ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].
	2.10.85	Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended.	The access roads will be formed from permeable stone surfacing. This is addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].
	2.10.86	Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses.	The proposed solar arrays will not create any significant change to the current surface water drainage regime and the majority of the Site will remain permeable. There will be no impact on existing watercourses. This is addressed in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	2.10.87	Culverting existing watercourses/drainage ditches should be avoided.	N/A. No culverting is proposed as part of the development (all watercourse crossings will be formed from open span structures).
	2.10.88	Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives exist and where	N/A. No culverting is proposed as part of the development (all watercourse crossings will be formed from open span structures).

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		necessary it will only be in place temporarily for the construction period	
NPS EN-5	2.3.2	As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;	All solar modules and equipment will be designed above the design flood level as agreed with the EA. The most sensitive equipment (including BESS compound and Frodsham Substation) is located outside of the Flood Zone 2 and 3 extents. This is addressed in detail in Section 9.8 of this ES Chapter and ES Volume 1 Chapter 2: The Proposed Development [EN010153/DR/6.1]
National Planning Policy Framework (NPPF) (2024)	170.	Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.	The most sensitive equipment (including BESS compound and Frodsham Substation) is located outside of the Flood Zone 2 and 3 extents. All solar modules and equipment will be designed above the design flood level as agreed with the EA, ensuring the Site can remain operational during a flood event. This is addressed in Section 9.8 and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	172.	All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by: a) applying the sequential test and then, if necessary, the exception test as set out below; b) safeguarding land from development that is required, or likely to be required, for current or future flood management;	The Sequential Test provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that there are no reasonable available sites (taking into account wider sustainable development objectives in areas of lower flood risk within which the Proposed Development could be located... As such an Exception Test is provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment and summarised in ES Volume 2 Appendix 9-1: Flood Risk Assessment and

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.	Drainage Strategy [EN010153/DR/6.2] that demonstrates both elements of the Exception Test are satisfied.
	174.	…Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding…	The Sequential Test provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that there are no reasonable available sites (taking into account wider sustainable development objectives in areas of lower flood risk within which the Proposed Development could be located.
	177.	Having applied the sequential test, if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.	An Exception Test is provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment and summarised in in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] that demonstrates both elements of the Exception Test are satisfied.
	178 & 179	The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that: a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and	An Exception Test is provided in in ES Vol 2 Appendix 3-1: Alternative Site Assessment and summarised in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] that demonstrates both elements of the Exception Test are satisfied.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. Both elements of the exception test should be satisfied for development to be allocated or permitted.	
	181	When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that: a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.	Section 9.7 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] assess the risk of flooding to the development and the impact on flood risk elsewhere. The assessment demonstrates that the development has been designed to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. The most sensitive equipment (including BESS compound and Frodsham Substation) is located outside of the Flood Zone 2 and 3 extents. The use of SuDS is considered in this assessment. This application is supported by a Flood Warning and Evacuation Plan, provided as an appendix to ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	182.	Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should: a) take account of advice from the Lead Local Flood Authority; b) have appropriate proposed minimum operational standards; and c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.	The use of SUDS (including their treatment and maintenance) is addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
Flood Risk and Coastal Change PPG (2022)	-	Provides detailed requirements to fulfil the overarching policies set out in the NPPF including the Sequential and Exception Test, the requirements for an FRA, the promotion of SUDS to manage surface water and consultation with relevant authorities.	This is addressed in detail in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]

9.2.20 Relevant local planning policies are summarised in **Table 9.2.**

Table 9-2 — Summary of local planning policy and guidance

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
Cheshire West and Chester Council (CWaCC) Local Plan (Part One) (2015)	ENV1	All development must follow the sequential approach to determining the suitability of land for development, directing new development to areas at the lowest risk of flooding and where necessary apply the exception test, as outlined in national planning policy.	The Sequential Test provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that there are no reasonable available sites (taking into account wider sustainable development objectives in areas of lower flood risk within which the Proposed Development could be located. A sequential approach has been taken within the design of the Site layout with the most sensitive equipment (including BESS compound and Frodsham Substation) located outside of the Flood Zone 2 and 3 extents and the panels designed to be at a height to avoid flooding. The sequential approach to design is addressed in detail in ES Vol 1 Chapter 3: Alternatives and Design Evolution [EN010153/DR/6.1]
	ENV1	Developers will be required to demonstrate, where necessary, through an appropriate Flood Risk Assessment (FRA) at the planning application stage, that development proposals will not increase flood risk on site or elsewhere, and should seek to reduce the risk of flooding. New development will be required to include or contribute to flood mitigation, compensation and/or protection measures, where necessary, to manage flood risk associated with or caused by the development.	Section 9.7 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] assess the risk of flooding to the development and the impact of development on flood risk elsewhere. The assessment demonstrates that the development has been designed to ensure it is safe for its lifetime without increasing flood risk elsewhere.
	ENV1	Development proposals should comply with the Water Framework Directive by contributing to the North West River Basin Management Plan and Dee River Basin Management Plan objectives, unless it can be demonstrated that this would not be technically feasible.	ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2] details how the development complies with the North West

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
			River Basin Management Plan environmental objectives.
	ENV1	The drainage of new development shall be designed to reduce surface water run-off rates to include the implementation of Sustainable Drainage Systems (SUDS) unless it can be demonstrated that it is not technically feasible or viable	The use of SuDS as part of the development is addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]
	ENV1	Proposals within areas of infrastructure capacity and/or water supply constraint should demonstrate that there is adequate wastewater infrastructure and water supply capacity to serve the development or adequate provision can be made available.	N/A
Cheshire West and Chester Council (CWACC) Local Plan (Part Two) (2015)	DM40	In line with Local Plan (Part One) policy ENV 1, flood risk must be avoided or reduced by: 1. locating development within areas of lower flood risk through the application of a borough-wide sequential test and then, where required, applying the exception test in line with the National Planning Policy Framework; and 2. ensuring development proposals in flood risk areas are actively managed and reduce flood risk by applying the sequential approach at site level.	The Sequential Test provided in ES Vol 2 Appendix 3-1: Alternative Site Assessment [EN010153/DR/6.2] demonstrates that it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk. A sequential approach has been taken within the design of the Site layout with the most sensitive equipment (including BESS compound and Frodsham Substation) located outside of the Flood Zone 2 and 3 extents and the panels designed to be at a height to avoid flooding. The sequential approach to design is addressed in detail in ES Vol 1 Chapter 3: Alternatives and Design Evolution [EN010153/DR/6.1]
	DM40	Where a site-specific Flood Risk Assessment is required in line with the National Planning Policy Framework (NPPF) (vi), this will be expected to	Hydraulic modelling has been undertaken and demonstrates the development is safe for its lifetime

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		demonstrate whether a Proposed Development is likely to be affected by current or future flooding (including effects of climate change) from any source.	(including climate change allowances) without increasing flood risk elsewhere. ES Vol 2 Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2] and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] detail the flood risk to the site and associated mitigation from future flooding.
	DM40	Development proposals for sites that are at risk will only be supported where the Site-specific Flood Risk Assessment shows that: 1. the effects of climate change have been taken into account; 2. there is no loss in floodplain storage resulting from the development; 3. the development will not increase flood risk elsewhere; 4. there is no adverse effect on the operational functions of any existing flood defence infrastructure; 5. proposed resistance / resilience measures designed to deal with current and future risks are appropriate; 6. where applicable, appropriate Sustainable Drainage System (SuDS) techniques have been considered and are to be incorporated into the design of the Site, in line with Local Plan (Part Two) policy DM 41; and 7. the development will be safe and pass the exception test, if applicable.	ES Vol 2 Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2] and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] demonstrates that the development is safe for tis lifetime, and there is no increase in flood risk elsewhere as a result of the development. Mitigation measures have been proposed to address future flood risk and are detailed in Section 9.8 of this ES chapter.
	DM40	A Flood Risk Assessment will be required for development within a Critical Drainage Area (CDA) as notified by the Environment Agency. All development in a designated CDA will be required to incorporate measures to alleviate surface water flood risk through the layout and form of the development, including the appropriate application of SuDS to intercept and attenuate overland flow and drained water in line with Local Plan (Part Two) policy DM 41 and the Council's Draft SuDS Design and Technical Guidance.	N/A

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	DM40	Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Applicants will be required to provide schemes to reduce flood risk on individual sites through flood resilient design and on site flood risk management measures. It is essential that the scheme proposed does not create any additional flood risk outside the development in any part of the catchment, either upstream or downstream.	A sequential approach has been taken within the design of the Site layout with the most sensitive equipment (including BESS compound and Frodsham Substation) located outside of the Flood Zone 2 and 3 extents and the panels designed to be at a height to avoid flooding. The sequential approach to design is addressed in detail in ES Vol 1 Chapter 3: Alternatives and Design Evolution [EN010153/DR/6.1]
	DM40	Existing structures and other features that help to reduce the risk of flooding or mitigate its impacts should be protected. Their loss, alteration or replacement will only be permitted where there would be no increase in flood risk.	Section 9.7 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] details the existing structures, including flood defences, which will be retained and unaltered as part of the development. Replacement bridges will increase soffit heights and will not impact on the channel capacity of watercourses. l
	DM41	In line with Local Plan (Part One) policy ENV 1, proposals for major development will be required to incorporate Sustainable Drainage Systems (SuDS).	Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] sets out the use of SuDS as part of the development.
	DM41	SuDS must be included in the early stages of the Site design in order to incorporate appropriate SuDS within the development. SuDs schemes will be required to satisfy technical standards and design requirements having regard to the Council's Draft SuDS Design and Technical Guidance.	Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2] sets out the use of SuDS as part of the development.
	DM41	On greenfield sites, restrictions on surface water runoff from new development should be incorporated into the development at the planning stage and must mimic or improve upon greenfield rates…	Discharge from areas served by a formal drainage system i.e. the BESS and Frodsham substation will be restricted to a limited greenfield rate.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
	DM42	In line with Local Plan (Part One) policies ENV 1 and ENV 3, development within or adjacent to* a flood water storage area, as defined on the policies map, which would have a negative impact on its function will not be supported. *adjacent means within eight metres of the boundary of the flood water storage area as defined on the policies map or within eight metres of the landward toe of any associated flood defence structure.	N/A No designated flood storage areas within vicinity of the Site.
	DM43	…development proposals will be supported where it can be demonstrated that the proposal will not cause unacceptable deterioration to water quality or have an unacceptable impact on water quantity (including drinking water supplies) or waste water infrastructure capacity by ensuring that: 1. sufficient water resources are available and the proposal does not have a detrimental impact on the flow or quantity of groundwater; 2. development does not affect the water quality of surface or groundwater; 3. development does not cause unacceptable harm to biodiversity; 4. opportunities to improve water quality are used where possible; 5. water efficiency methods are optimised; 6. wastewater infrastructure already exists or can be provided in time to serve the development. Development should connect to the nearest point of adequate capacity.	Providing mitigation measures are implemented, the proposed scheme will have a negligible effect on the water quality and quantity during both the construction and operational phases. This is addressed in Section 9.8 of this ES Chapter and ES Volume 2 Appendix 9-2: Water Framework Directive Assessment [EN010153/DR/6.2]
Ince Neighbourhood Plan (2023)	NAT3	In order to protect and enhance the local wildlife, all development should, where possible – …b) Embed out of bounds areas and dark corridors along watercourses, woodland edges and hedgerows into the environmental design of a scheme… …f) ensure that any surface water discharge to a sensitive habitat location is supported by a drainage design which incorporates a treatment train that secures no unacceptable detriment to the receiving habitat…	Surface water treatment and the use of SuDS is addressed in ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]. ES Vol 1 Chapter 7: Terrestrial Ecology [EN010153/DR/6.1] addresses matters relating to enhancing local wildlife.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph	Where addressed in the ES
		…g) incorporate sustainable drainage schemes (suds) which incorporate an appropriate treatment train that secures no unacceptable detriment to the receiving habitat…	
Frodsham Neighbourhood Plan (2024)	This plan contains no policies pertaining to flood risk, drainage or water quality.		

Guidance

9.2.21 Guidance documents have been reviewed and include the following:

i) The Cheshire West and Chester Council Strategic Flood Risk Assessment (SFRA) (March 2016) & The Cheshire West and Chester Council Preliminary Flood Risk Assessment (PFRA) (2017-2023)

ii) The Cheshire West and Chester Council Local Flood Risk Management Strategy (February 2016).

iii) The Cheshire West and Chester Borough Council Sustainable Drainage Systems (SuDS) Guidance – (volume 1) (v4) (June 2020).

iv) The North West River Basin District River Basin Management Plan: 2022 and the Dee River Basin Management Plan: 2022.

v) The CIRIA C753 ‘The SuDS Manual’ 2015.

9.3 Assumptions and Limitations

9.3.1 All third-party published information and data is assumed to be correct, up to date and based on verified and accurate records, for example, Environment Agency (EA) flood mapping and British Geological Survey (BGS) geological mapping.

9.3.2 Channel and floodplain roughness utilised in the current EA hydraulic models have been reviewed against available survey data and aerial photographs and found to be appropriate for use in this study. The channel roughness values may vary over the year.

9.3.3 Hydraulic model cell sizes (6m for the Weaver and 10m for the Mersey) have been used to represent the floodplain features across the model extents to an appropriate level of detail. A lower cell size is not possible due to the scale and stability of the model. Off-site impact has been assessed using a flow constriction approach, blocking out a percentage of cells based on the displacement, and increasing roughness at the location of the solar panels, as agreed with the EA.

9.3.4 The change in climate projected by models in UKCP18 is strongly dependent on future global greenhouse gas emissions. UKCP18 uses scenarios for future greenhouse gases called the representative concentration pathways (RCPs) which cover a more up-to-date (compared to UKCP09) range of assumptions around future population, economic development and to explicitly include the possibility of mitigation of greenhouse gas emissions towards international targets.

9.3.5 It is assumed that all required permits and formal agreements will be sought and obtained with relevant consultees pursuant to the terms of the DCO or outside of it.

9.3.6 Two site walkovers have been undertaken by Waterco Ltd. The purpose of the first Site walkover was to inspect the watercourses and proposed watercourse crossing locations on site. A second site walkover was

undertaken to inspect the condition of the flood defences along the River Weaver.

9.3.7 It is assumed that wastewater flow (domestic wastewater from toilet or canteen facilities) generated on site will be collected and tankered off site.

9.4 Consultation and Engagement

9.4.1 A Scoping Report (**ES Vol 2 Appendix 1-1 - Frodsham Solar Scoping Report (May 2023) [EN010153/DR/6.2]**) was submitted to PINS on the 26 May 2023. The report sets out the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria to be applied in the assessment to identify and evaluate the likely significant effects of the Proposed Development.

9.4.2 A Scoping Opinion was received on 10 July 2023 (**ES Vol 2 Appendix 1-2- Planning Inspectorate Scoping Opinion (July 2023) [EN010153/DR/6.2]**). The feedback received from PINS and stakeholders within the Scoping Opinion, on points relating to Flood Risk, Drainage & Surface Water, are summarised in Table 1 of **Appendix 9-5 Scoping and PEIR Consultation Responses [EN010153/DR/6.2]**.

9.4.3 The Preliminary Environmental Information Report ('PEIR') was provided as part of the statutory pre-application consultation in late 2024. Feedback received from consultees regarding Flood Risk, Drainage & Surface Water, along with a summary of how the points raised have been addressed, is provided in Table 2 of **Appendix 9-5 Scoping and PEIR Consultation Responses [EN010153/DR/6.2]**.

9.4.4 A summary of other engagement and consultation undertaken in relation to Flood Risk, Drainage & Surface Water is included in **ES Vol 2 Appendix 9-5 – Consultation Responses [EN010153/DR/6.2].**

9.5 Assessment Methodology

Study Area & Scope of Assessment

9.5.1 The Order Limits form the core study area for this assessment. However, impacts on flood risk and water quality can extend downstream, and potentially upstream of the Site. The study area, in terms of assessment of the impact of the development, is consistent with the extent of hydraulic modelling for the River Weaver and Mersey. The models extend up to where the Mersey discharges into the sea (24km downstream of the Site). The upstream study area, in terms of assessment of impact, is limited to a 1km radius from the Site.

Methodology

Flood Risk

9.5.2 All potential sources of flooding have been reviewed as part of this assessment including fluvial (from rivers), tidal, surface water, sewer flooding, groundwater and artificial sources. The existing flood risk to the Site has been assessed using a range of information sources including:

i) EA fluvial, tidal, surface water and reservoir flood mapping [vi]
ii) Fluvial and tidal modelled outputs provided by the EA (products 4, 5, 6 and 8)
iii) Waterco Hydraulic Modelling Outputs
iv) Site specific topographical survey & 1m resolution EA composite Light Detecting and Ranging (LiDAR) Digital Terrain Model (DTM)[vii]
v) Cheshire West and Chester Council Strategic Flood Risk Assessment (SFRA)[viii]
vi) Draft Cheshire West and Chester Council Preliminary Flood Risk Assessment (PFRA)[ix]

9.5.3 The assessment of fluvial and tidal flood risk is informed by hydraulic modelling. The hydraulic modelling derives flood depths, water levels, velocities and flood hazards from a range of fluvial and tidal sources. The modelling considers the baseline and future baseline (climate change allowances) scenarios. The model also considers risk in a defended (with flood defences) scenario and a breach scenario. Joint probability tidal and fluvial flood events are also considered.

9.5.4 The current EA Mersey Estuary and EA Lower Weaver FMP/TUFLOW hydraulic models have been used as a base for the additional modelling work. The models were set up to consider updated climate change allowances and take into account the latest Coastal Flood Boundary (CFB) data.

9.5.5 The current EA Manchester Ship Canal Model has been obtained and is considered fit for purpose. Outputs from this model including flood depth mapping and in-channel water levels have been reviewed to assess any associated flood risk. The current EA Ince and Frodsham model has been reviewed and an updated hydrology assessment undertaken to consider climate change allowances (refer to **ES Volume 2 Appendix 9-4: Ince and Frodsham Technical Note [EN010153/DR/6.2]).**

9.5.6 Full details of the hydraulic modelling for the River Weaver and tidal Mersey are included in **ES Vol 2 Appendix 9-3 Hydraulic Modelling Report [EN010153/DR/6.2]**

9.5.7 Surface water flood risk has been assessed using topographic data, historical records and EA published surface water flood mapping.

9.5.8 Sewer flooding has been assessed using topographic data and sewer records. Albeit there are no public sewers in the immediate vicinity.

9.5.9 Groundwater flooding has been assessed using BGS borehole records available within the Site and historical records detailed in the SFRA and PFRA.

9.5.10 EA reservoir flood mapping has been used to assess the risk of flooding from failure of reservoirs.

Surface Water Drainage

9.5.11 An assessment of the existing (greenfield) surface water runoff rates has been carried out using the Revitalised Flood Hydrograph[x] method. This method uses an event-based rainfall-runoff model, to convert a design storm event of appropriate duration and return period into a corresponding design flood event of similar return period. As this method produces runoff hydrographs, it will provide an estimate of greenfield runoff volumes as well as estimates of the peak flow rate. This method is recognised as a suitable method for calculating greenfield runoff rates within the CIRIA SuDS Manual. Details of this are included in the FRA & Drainage Strategy, provided as **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].**

9.5.12 An attenuation storage estimate has been provided using MicroDrainage software.

Water Quality

9.5.13 Where Proposed Development has the potential to impact on current or predicted WFD status it is necessary to assess how the Proposed Development impacts the objectives defined for WFD water bodies potentially affected. As part of its role, the Environment Agency (EA) must consider whether new development proposals have the potential to:

i) Cause deterioration in the ecological, chemical or quantitative status of a waterbody; or

ii) Prevent the waterbody from achieving the required good status.

9.5.14 An assessment has been undertaken to establish the potential impact of the Proposed Development on the status of WFD waterbodies, this has been undertaken with reference to advice provided by the Planning Inspectorate,

Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive[xi].

9.5.15 The current baseline classifications of WFD waterbodies of interest i.e. that have the potential to be impacted by the Proposed Development, have been obtained from the EA[xii].

9.5.16 The full WFD assessment is included in **ES Vol 2 Appendix 9-2 Water Framework Directive Assessment [EN010153/DR/6.2].**

9.5.17 The impact of pollutants from the Site surface water drainage system have been assessed using the simple index approach detailed in Tables 26.2 and 26.3 of the CIRIA C753 publication 'The SuDS Manual' (2015).

Assessment of Significance / Assessment Criteria

9.5.18 The assessment of likely significant effects has been determined using principles of the guidance and criteria set out in the Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment (Ref 9-55) and adapted to suit the specific requirements of this project. Although these assessment criteria were developed for road infrastructure projects, this method is suitable for use on any development project, and it provides a robust and well tested method for predicting the significance of effects.

9.5.19 The assessment will consider the construction, operation and decommissioning phases. The level of effect attributed to each impact has been assessed based on the magnitude of change due to the development proposals and the sensitivity of the affected receptor / receiving environment to change.

9.5.20 There are three stages to the assessment of effects on the water environment, which are as follows:

i) A level of sensitivity (low to high) is assigned to the receptor based on a combination of attributes as outlined in **Table 9-5.**

ii) The magnitude of potential and residual impact (classed as negligible, minor, moderate or major adverse / beneficial) is determined based on the criteria listed in **Table 9-6** and the assessor's professional judgement.

iii) A comparison of the sensitivity of the receptor and magnitude of the impact (for both potential and residual impacts) results in an assessment of the overall level of effect on the receptor using the matrix presented in **Table 9-7.** It should be noted that although the impact assessment matrix provides a good framework for the consistent assessment of impacts across all environmental parameters, there is still an important role for professional judgement and further objective assessment to play in moderating an impact's significance (where applicable). Given that the criteria represent levels of effect on a continuum, professional judgement and awareness of the relative balance between magnitude and importance / sensitivity is required.

Table 9-5 – Criteria to determine sensitivity of the receptor (adapted from DMRB LA113, Ref 9-55)

Sensitivity	Criteria	
High	Surface Water/Waterbodies	A watercourse classified as high or good in accordance with the WFD. Site protected/ designated under EC or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site), Species protected by EC legislation. Critical social or economic uses (e.g. public water supply and navigation) The hydromorphology of the waterbody conforms closely to natural, unaltered state and will often exhibit well developed and diverse geomorphic forms.
	Groundwater	Source Protection Zone (SPZ) 1 or 2; Principal aquifer providing a regionally and/or locally important resource and/or supporting a site protected under EC and UK legislation.
	Flood Risk	Flood Zone 3a and/or 3b; Essential Infrastructure or highly vulnerable development. High risk from non- fluvial flood sources. Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding;
Medium	Surface Water/Waterbodies	A watercourse classified as moderate in accordance with the WFD, or a non-WFD waterbody hydrologically linked to a WFD waterbody with moderate classification. May be designated as a local wildlife site (LWS) and support a small / limited population of protected species. The waterbody shows signs of previous alteration and/or minor flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.
	Groundwater	SPZ 3. A Secondary Aquifer providing water for agricultural or industrial use with limited connection to surface water.
	Flood Risk	Flood Zone 2; less vulnerable property and land such as public, commercial and industrial buildings. Medium risk from non-fluvial flood sources. Floodplain or defence protecting 10 or fewer industrial properties from flooding.
Low	Surface Water/Waterbodies	A watercourse classified as poor or bad in accordance with the WFD or watercourses not having a WFD classification. Low aquatic fauna and flora biodiversity and no protected species. The hydromorphology of the waterbody has been substantially modified by past land use, previous engineering works or flow/ water level regulation.

	Groundwater	Generally unproductive strata
	Flood Risk	Flood Zone 1. Water compatible development. Low risk from non-fluvial flood sources.

Table 9-6 – Criteria to determine magnitude of impact (adapted from DMRB LA113, Ref 9-55)

Magnitude	Criteria	Examples	
Major adverse	Results in a loss of attribute and/ or quality and integrity of the attribute. Major change from the baseline conditions	Surface Water/Waterbodies	Significant damage to land and property users. Loss or extensive change to a fishery. Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification.
		Groundwater	Loss of, or extensive change to, an aquifer; Loss of regionally important water supply; Loss of, or extensive change to groundwater dependent terrestrial ecosystem (GWDTE) or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification; Loss or significant damage to major structures through subsidence or similar effects
		Flood Risk	Increase in flood risk offsite to residential and industrial development and/or emergency services.
Moderate adverse	Results in impact on integrity of attribute, or loss of part of attribute. Moderate change from the baseline conditions	Surface Water/Waterbodies	Damage to land and property users. Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification.
		Groundwater	Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial/industrial/agricultural supplies. Partial loss of the integrity

Magnitude	Criteria	Examples	
			of GWDTE. Contribution to reduction in water body WFD classification. Damage to major structures through subsidence or similar effects or loss of minor structures.
		Flood Risk	Increase in flood risk offsite to undeveloped agricultural land already at flood risk
Minor adverse	Results in some measurable change in attribute's quality or vulnerability. Minor change from the baseline conditions	Surface Water/ Waterbodies	Minor effects on water supplies
		Groundwater	Minor effects on an aquifer, GWDTEs, abstractions and structures.
		Flood Risk	No overall change in flood risk elsewhere
Negligible	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity.	Surface Water/ Waterbodies	The proposed project is unlikely to affect the integrity of the water environment
		Groundwater	The proposed project is unlikely to affect the integrity of the water environment.
		Flood Risk	No overall change in flood risk elsewhere.
Minor beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring. Minor change from the baseline conditions	Surface Water/ Waterbodies	Contribution to minor improvement in water quality, but insufficient to raise WFD classification
		Groundwater	Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding.
		Flood Risk	Creation of flood storage & minor decrease in flood risk elsewhere

Magnitude	Criteria	Examples	
Moderate beneficial	Results in moderate improvement of attribute quality. Moderate change from the baseline conditions	Surface Water/ Waterbodies	Contribution to improvement in waterbody WFD classification.
		Groundwater	Contribution to improvement in water body WFD classification. Improvement in water body catchment abstraction management strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE.
		Flood Risk	Creation of flood storage & decrease in flood risk elsewhere to undeveloped agricultural land
Major beneficial	Results in major improvement of attribute quality. Major change from baseline conditions	Surface Water/ Waterbodies	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in water body WFD classification.
		Groundwater	Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body WFD classification
		Flood Risk	Creation of flood storage & decrease in flood risk offsite to residential/industrial properties and/or emergency services.

Table 9-7 – Matrix for the Calculation for Level of Effect

Magnitude of Impact	Sensitivity of Feature		
	High	Medium	Low
Major	Major	Major	Moderate
Moderate	Major or Moderate	Moderate	Minor
Minor	Moderate or Minor	Minor	Minor or Negligible
Negligible	Minor	Negligible	Negligible

9.5.21 Where the level of effect is *minor* or *negligible* it is more likely to be considered not significant, whereas a perceived *moderate* or *major* effect, means the effect is more likely to be considered significant.

9.5.22 Whether an effect is considered significant is therefore guided by **Table 9-7** but is determined using professional judgement. For example, a 'moderate' adverse effect at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

9.5.23 Where significant adverse effects are identified, mitigating measures must be examined and recommended in order to reduce potential effects, as far as possible, to environmentally acceptable levels. Residual effects must then be stated.

9.6 Baseline Conditions

Topographical Setting

9.6.1 Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution EA composite Light Detecting and Ranging (LiDAR) Digital Terrain Model (DTM). A review of LiDAR data shows that the western extent of the Solar Array Development Area (SADA) i.e. land within Manchester Ship Canal Dredging Deposit Ground Cells 1, 2 and 5 (see **ES Vol 3 Figure 1-4**), are situated at an elevated level between 10m AOD and 12.5m AOD. The remainder of the SADA, to the east of Brook Furlong, forms lower lying land and is relatively flat with levels varying from 4.6m AOD to 5.1m AOD.

Geological Setting

9.6.2 The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the Site is underlain by Tidal Flat deposits comprising clay, silt and sand. The superficial deposits are identified as being underlain by the Helsby Sandstone Formation, the Wilmslow Sandstone Formation and the Chester Formation (sandstone).

9.6.3 Numerous BGS borehole records are located within the Site. Within the eastern half of the Site, BGS borehole records generally indicate a layer of topsoil, underlain by a layer of clay, with thin layers of silt and sand at the bottom of excavated boreholes.

9.6.4 Historical BGS borehole reference SJ57NW318 is located at NGR: 351096, 378754. This record identifies slightly sandy clay topsoil from ground level to 0.3metres below ground level (‘m.bgl’). Firm to stiff grey mottled orange sandy (find-medium) silty clay is identified between 0.3m.bgl to 3m.bgl. This is underlain by dark grey silty fine and medium sand to the base of the borehole (4.0m.bgl). Water was struck at 1.20m.bgl.

9.6.5 Historical BGS borehole reference SJ57NW316 is located at NGR: 351697, 378684 and identifies similar strata. Grass onto dark brown slightly sandy (fine to coarse) clay topsoil is encountered from ground level to 0.2m.bgl. Soft to firm orange brown mottled grey slightly sandy silty clay is identified between 0.2m.bgl to 2.30m.bgl. Soft black slightly sandy (fine-medium) clayey silt is identified below this to the base of the borehole (4.70m.bgl). Water was struck at 2.80m.bgl.

9.6.6 Within the western half of the Site, within the Manchester Ship Canal Dredging Ground Cells, borehole records derived from the wind farm, show made ground comprising a mix of sandy slit and sandy silty clay to depths of between 5.45m.bgl and 9.0m.bgl. This was typically followed by medium dense gravelly silty sand with occasional bands of silty clay to the base of the boreholes to 35m.bgl. Organic silty clay transitioning into clayey fibrous peat is recorded at depths of circa 12m.bgl to circa 17m.bgl.

9.6.7 According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed May 2025], the tidal flat deposits are classified as a Secondary Undifferentiated Aquifer. Secondary Undifferentiated Aquifers are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

9.6.8 The underlying Wilmslow, Chester and Helsby Sandstone Formations are described as Principal Aquifers. Principal Aquifers 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.

9.6.9 The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed May 2025], indicates that the Site is not located within a Groundwater Source Protection Zone. There are no EA registered, or private water abstractions located on the Site.

9.6.10 The Cranfield University 'Soilscapes' map [accessed May 2025] indicates that the Site is underlain by 'loamy and sandy soils with naturally high groundwater and a peaty surface'.

9.6.11 According to MAGIC's online mapping [accessed May 2025] designated sites which are within 1km of the Site are as follows:

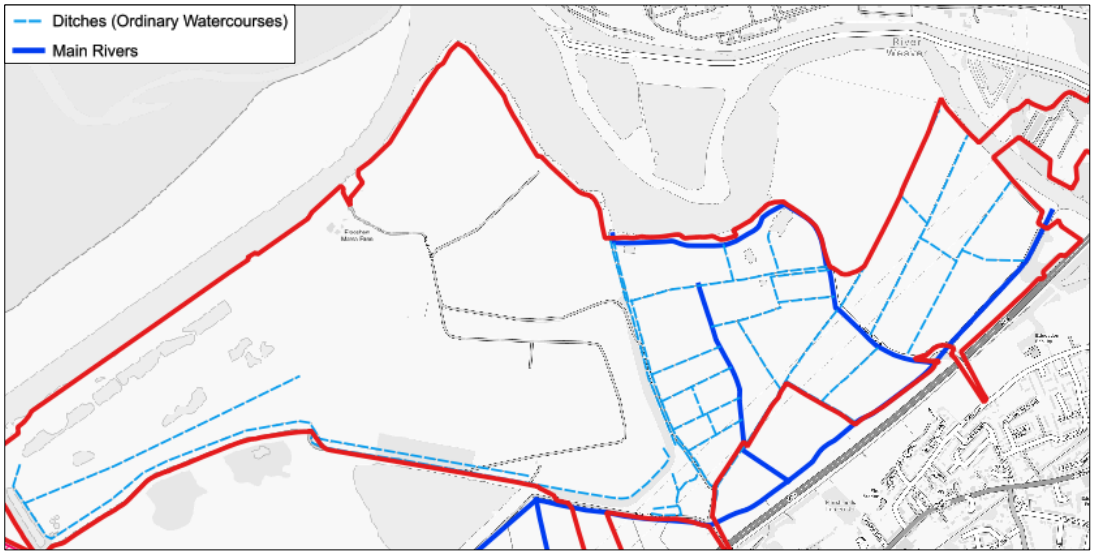
i) Mersey Estuary Sites of Special Scientific Interest (SSSI) covers the north-western extent of the Site (Canal Pools in the NBBMA).
ii) Mersey Estuary (Ramsar Site) 70m north-west of the Site at its nearest point
iii) Mersey Estuary Special Protection Area (SPA) 70m north-west of the Site at its nearest point
iv) Frodsham Railway and Road Cuttings SSSI 386m south-east
v) River Weaver (Dane to Frodsham) NVZ
vi) The Mersey Forest
vii) Liverpool, Manchester and West Yorks Greenbelt
viii) Drinking Water Safeguard Zones (Groundwater) 510m south-east
ix) Source Protection Zone III - Total Catchment 700m south-east
x) Grade II Listed buildings
xi) Castle Park Frodsham 525m south-east (Historic Non-Statutory Designation)

9.6.12 There are several non-statutory designated sites within 1 km of the Site, which are all local wildlife sites (LWSs). Frodsham, Helsby and Ince Marshes LWS covers much of the Site. Frodsham Field Studies centre LWS is approximately 30m north-east of the proposed Site. The Sites are designated for similar reasons to the statutory designated sites. Further detail on designated sites is contained within **ES Vol 1 Chapter 7 Terrestrial Ecology [EN010153/DR/6.1]**

Hydrological Setting

9.6.13 The Site is intersected by several ditches and designated EA 'Main Rivers'. A map showing the location of watercourses on site (Main Rivers & Ordinary Watercourses) is included in **Image 9-1** below.

Image 9-1 – Watercourses on site



9.6.14 The ditches in the eastern extent of the SADA flow to the easternmost extent of the Site where flows are then pumped into the River Weaver via an EA pumping station (Frodsham Pumping Station).

9.6.15 There are several ponds located within the NBBMA, to the immediate north of Cell 3. The ponds, which partially fall within the Mersey Estuary SSSI, are understood to be used informally for recreational fishing. A larger pond (known as the BPAW Manchester Ship Canal Pool) is shown along the western boundary of the NBBMA. Ditches in this area drain west and discharge to the Manchester Ship Canal.

9.6.16 The River Weaver is located north-east of the Site and flows north-west to join the Manchester Ship Canal. The Manchester Ship Canal is located immediately north-west of the Site and flows south-west. The Manchester Ship Canal joins the River Mersey approximately 12.7km south-west of the Site. The River Mersey is located approximately 250m north-west of the Site

at its nearest point and flows south-west. The River Mersey is tidally influenced in this location.

9.6.17 The Weaver Navigation (a canal) is located beyond the River Weaver, approximately 250m north-east of the Site at its nearest point. There are no direct or indirect discharges from ditches on the Site into the Weaver Navigation.

9.6.18 Land west of the Site comprises Ince Marsh which is served by a number of ditches and EA main rivers. Flows from Ince Marsh are discharged to the Manchester Ship Canal via an EA pumping station (Ince Pumping Station) located approximately 3.37km south-west of the Site.

9.6.19 The Site is located in an area which benefits from flood defences.

Flood Defences

9.6.20 Flood defences on site include Natural high ground adjacent to the EA Main Rivers within the Site. Based on the EA 'Asset Information and Maintenance Programme' data (data.gov.uk), the main rivers on site are designated as being 'fluvial'. The crest level of the defences are approximately 300mm above adjacent ground levels.

9.6.21 Flood defences adjoining the River Weaver and the River Mersey would play a role in defending the Site from both fluvial and tidal flooding. These flood defences include:

i) An earth embankment adjacent to the River Weaver on the eastern boundary of the Site. The minimum defence crest level of the embankment varies from 6.9m AOD to 7.6m AOD. The defence condition is classified as 'fair'.
ii) Engineered high ground along the northern boundary of the Site adjacent to the River Weaver. Defence crest levels are in the region of 6.7m AOD. The defence condition is classified as 'fair'.

iii) An earth embankment located approximately 400m north-west of the Site between the Manchester Ship Canal and the River Mersey. This flood defence protects the Site from the River Mersey and has a defence crest level of 6.6m AOD. No information is available on the condition of the flood defence.

iv) Engineered high ground in the western and north-eastern extents of the Site provides an informal flood defence.

9.6.22 Flood defence asset inspection reports have been undertaken for the flood defences adjoining the River Weaver and are included in the **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**. The defences adjacent to the rivers which intersect the Site were not inspected as they are classified as natural high ground and do not play a function in protecting the Site from flooding.

9.6.23 The locations of formal flood defences are shown on the EA 'Flood Map for Planning' provided as Appendix F in the Flood Risk Assessment and Drainage Strategy report. **(ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2])**

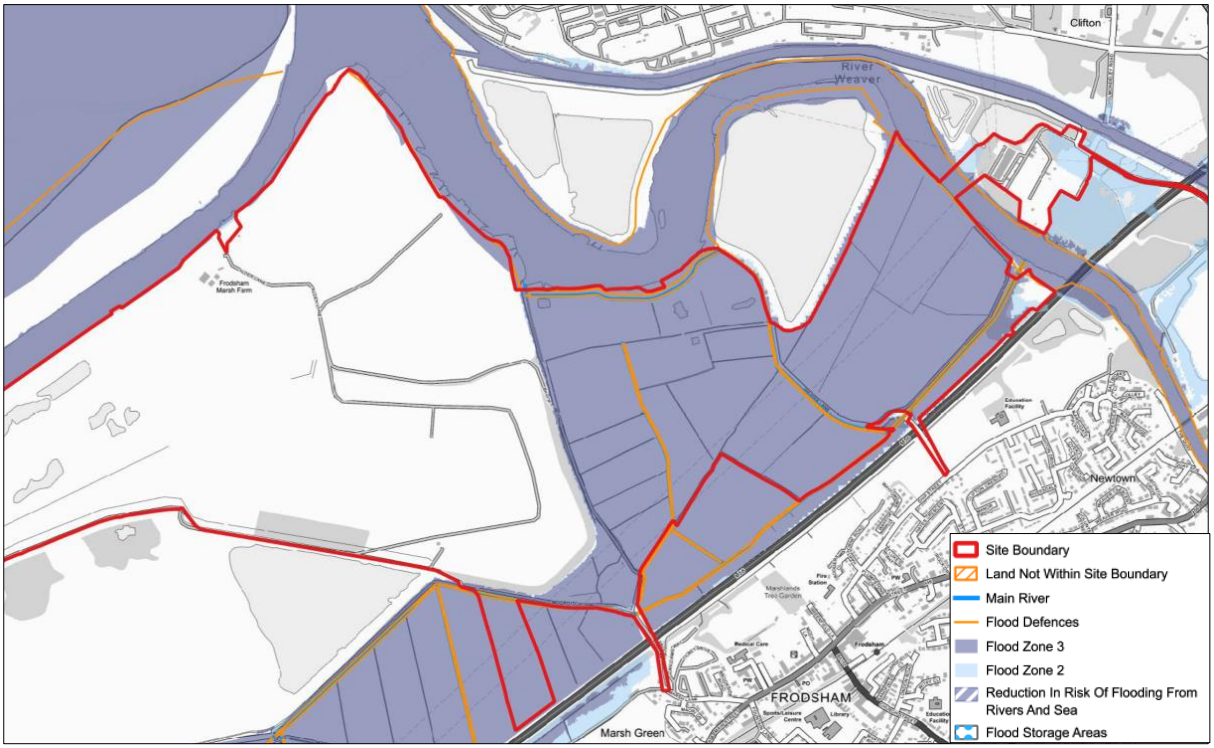
Baseline Assessment: Fluvial and Tidal Risk

9.6.24 The following paragraphs summarise the findings of the FRA (**ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**), which includes an assessment of the published & modelled data provided by the EA and additional hydraulic modelling undertaken for the Proposed Development.

9.6.25 The EA 'Flood Map for Planning' shows that the western extent of the SADA is located within Flood Zone 1 - an area outside of the extreme flood extent, considered to have a less than 0.1% annual probability of flooding. The remainder of the SADA is located within Flood Zone 3a – an area considered to be at flood risk with a 1% (1 in 100) or greater annual probability of flooding from rivers and / or a 0.5% (1 in 200) or greater annual probability of flooding

from the sea. An extract of the 'Flood Map for Planning is provided in **Image 9-2** below.

Image 9-2 – EA Flood Map for Planning



9.6.26 Fluvial flooding could occur if the River Weaver or Manchester Ship Canal overtopped their defences during or following an extreme rainfall event. Coastal / tidal flooding from the River Mersey or River Weaver could occur from overtopping of the defences during an extreme tidal event.

9.6.27 There is a residual risk of fluvial and tidal flooding which would occur should a breach in the River Mersey or River Weaver defences occur. There is also a residual risk of flooding from a failure of the pumping stations which serve Frodsham Marshes and Ince Marsh.

9.6.28 Model outputs (EA products 5 & 6) have been obtained from the EA. The modelled data has been taken from the Ince and Frodsham (2011), Lower Weaver (2020) and Mersey Estuary models.

9.6.29 Estimated flood levels for the Manchester Ship Canal have been obtained from the EA in October 2023. The flood levels are taken from the Manchester Ship Canal 2018 model.

9.6.30 The Lower Weaver and Mersey Estuary hydraulic models have been updated to consider the latest climate change allowances, breach scenarios and the interaction between the tidal and fluvial flood risk. The current EA Mersey Estuary and EA Lower Weaver FMP/TUFLOW hydraulic models have been used as a base for the modelling undertaken. The EA Ince and Frodsham model (2011) has been reviewed and a hydrology assessment undertaken to provide a qualitative assessment of flood risk, including the effects of climate change, from the watercourses which intersect the Site.

9.6.31 Modelled outputs, including flood depth and water level mapping for a range of events, are included in the **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**.

Ince and Frodsham

9.6.32 The Ince and Frodsham model considers flood risk from Ince and Frodsham Marshes and the Manchester Ship Canal Company deposits grounds. The model considers a range of scenarios including ‘do nothing’ and ‘do minimum’.

Do Nothing

9.6.33 This scenario represents the flood risk to the Site should a failure of the Environment Agency (EA) pumping stations which serve Frodsham Marshes and Ince Marsh occur. In the Do Nothing scenario, isolated areas across the centre of the Site are estimated to flood during the 50% Annual Exceedance Probability (AEP) flood event with a maximum water level of 4.44m AOD. The flood extent is minimal.

9.6.34 During the 20% AEP and 10% AEP flood events the flood extent and levels are similar to that of the 50% AEP event. There is a marginal increase in

maximum water level during the 10% AEP event, with a maximum water level of 4.47m AOD recorded in the south-western extent of the Site. Water levels across the remainder of the Site reach a maximum of 4.46m AOD.

9.6.35 During the 4% AEP event, the areas of flooding are to the 50% AEP flood event. A maximum water level of 4.49m AOD is estimated. The majority of the Site is flood free.

9.6.36 During the 1.33% AEP event, there is a minimal increase in flood extent and the water level reaches a maximum of 4.54m AOD. During the 1% AEP event, the flood extent remains similar to that of the 1.33% AEP and a maximum water level of 4.55m AOD is estimated.

9.6.37 The majority of the Site is flood free during all considered events in the 'do nothing' scenario. The flood extent is generally constrained to low lying land directly adjacent to watercourses on site.

Do Minimum

9.6.38 The 'do minimum' scenario considers the 'maintenance and pump rates/levels assumed to be same as now'.

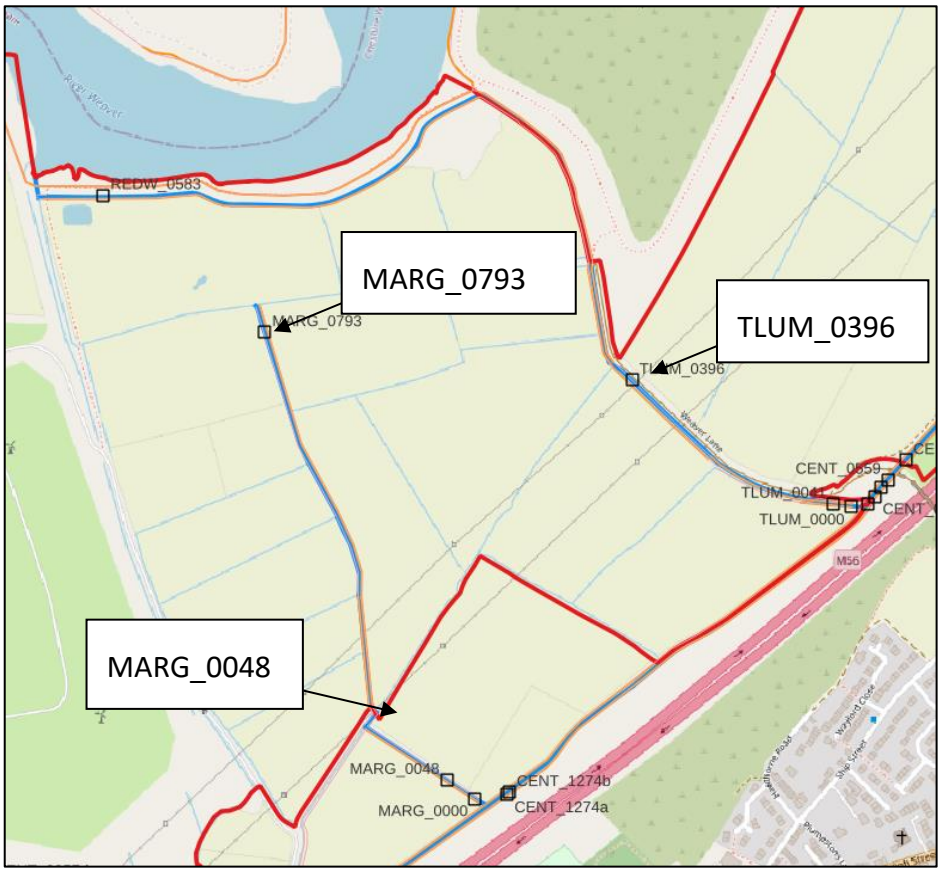
9.6.39 The Site is flood free during all considered events up to an including the 1% AEP flood event. No out of channel flooding is estimated.

9.6.40 **Table 9-8** shows the in-channel water levels and adjacent flood defence heights for a range of node points within the Site for the 1% AEP 'Do Minimum' scenario. The node locations are shown in **Image 9-3**. The in-channel water levels are a minimum of 0.853m below the flood defence crest levels.

Table 9-8 Ince and Frodsham Model – In-channel Flood Levels

Node Location	Q100 Maximum Water Level (m AOD)	Defence Crest Height (m AOD)
MARG_0793	4.227	5.08
MARG_0048	4.062	5.23
TLUM_0396	3.389	5.15

Image 9-3 - Ince and Frodsham Model Node Locations



Lower Weaver

9.6.41 The Lower Weaver model considers flood risk from the River Weaver, between its confluence with Wincham Brook (between Northwich and Winnington) and the Manchester Ship Canal. The River Weaver model also considers flood risk from the Weaver Navigation.

9.6.42 A range of fluvial design events have been modelled for the existing site scenario in the Lower Weaver model. Key flood events considered are detailed in **Table 9-9.**

Table 9-9 - Lower Weaver Model Simulations

Watercourse / Source	Scenario	Event (% AEP)
Lower Weaver Fluvial	Defended	1% AEP present day
		0.1% AEP present day
		1% AEP plus 67% CC event (2080's epoch)

Watercourse / Source	Scenario	Event (% AEP)
		1% AEP plus 106% CC event (2080s epoch)
		Joint probability 1% AEP plus 67% CC fluvial event with 0.5% AEP Upper End CC (year 2075) tidal event.
	Breach (2no. breach scenarios on the River Weaver defences, discussed below)	1% AEP plus 67% CC event
		1% AEP plus 106% CC event
		Joint probability 1% AEP plus 67% CC fluvial event with 0.5% AEP Upper End CC (year 2075) tidal event.

9.6.43 Climate change scenarios are discussed in the Section 9.7 – Future Baseline.

Defended

9.6.44 The Site is flood free during all considered present day (year 2020) fluvial events, up to and including the 1.33% AEP defended fluvial event. As such, only more extreme flood events, as detailed in **Table 9-9**, have been considered.

9.6.45 The easternmost extent of the Site is estimated to flood during the 1% AEP present day event. During this event, floodwater is shown to flow through a low spot in the flood defences along the eastern boundary of the Site. Floodwater spills and flows in a south-westerly direction across the eastern extent of the Site. The maximum flood level is estimated at 5.19m AOD. However, flood levels are generally less than 5.05m AOD. Flood depths are generally below 300mm.

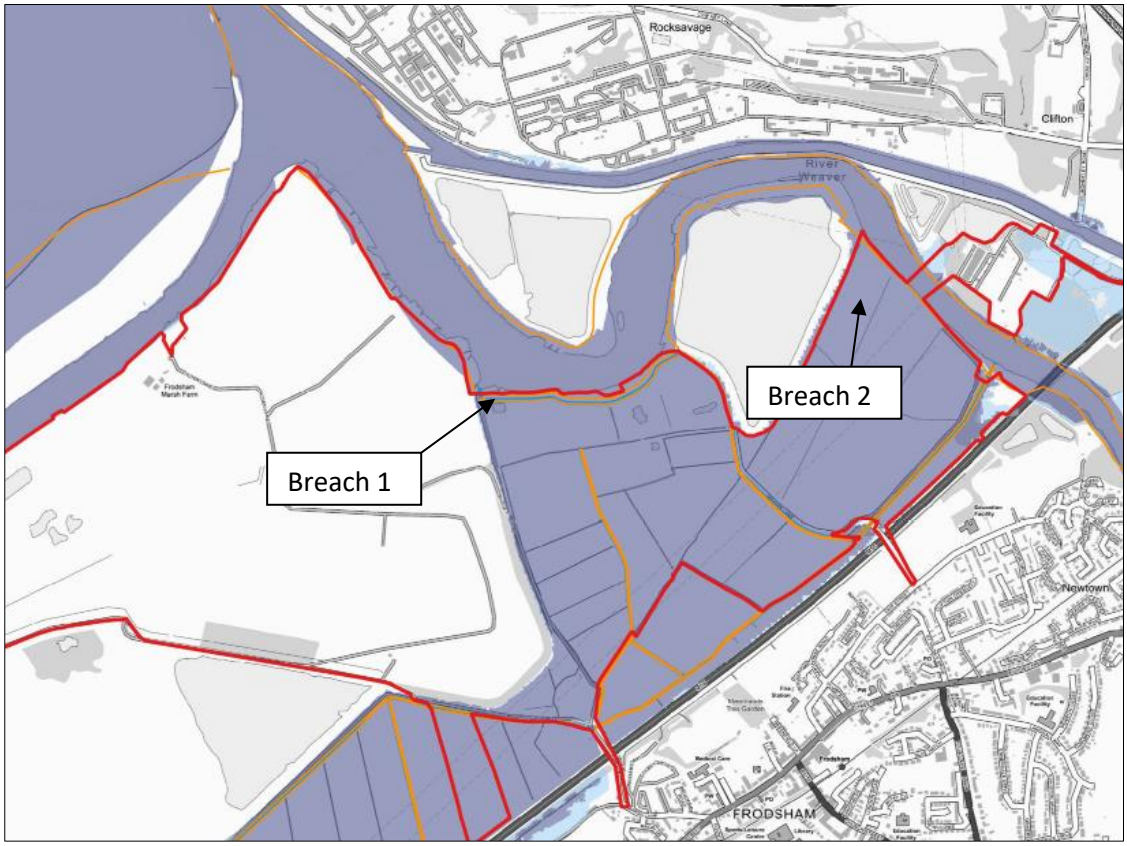
9.6.46 During the 0.1% AEP present day fluvial event, a maximum water level of 5.55m AOD is estimated in the eastern extent of the SADA.

9.6.47 The Site access route is flood free during all considered present day fluvial flood events

Breach

9.6.48 2no. breach scenarios has been assessed for the Lower Weaver model. The breach locations are shown in **Image 9-4**.

Image 9-4 – Weaver Breach Locations



9.6.49 The breaches have been set up by lowering a 50m section of flood defence along the River Weaver flood defences.

9.6.50 Breach scenarios have been modelled for future climate change scenarios which are discussed in Section 9.7 – Future Baseline

Manchester Ship Canal

9.6.51 The EA have provided in channel flood levels for the Manchester Ship Canal for a range flood events. In channel flood levels reach a maximum of 6.05m AOD during the 0.1% AEP event.

9.6.52 The minimum defence crest level along the northern site boundary is 6.8m AOD. A comparison of in-channel flood levels with the minimum defence crest level shows that no overtopping of the flood defences would occur, and the Site is flood free during all considered events.

Mersey Estuary

Defended

9.6.53 The Site is flood free during all events up to and including the present day 1% AEP defended event.

9.6.54 During the 0.5% AEP 2024 tidal event, floodwaters are shown to overtop the flood defences of the Mersey and subsequently the River Weaver defences situated along the northern boundary of the Site.

9.6.55 During the present-day 0.5% AEP event, the centre of the SADA is estimated to flood. Water levels vary from 5.42m AOD at the point of water entry into the Site; however, they are generally less than 5m AOD. Flood depths during this event range from 50 mm to 350 mm. The access route remains flood-free during this event.

9.6.56 During the 0.1% AEP event, the flood extent increases to cover the eastern extent of the SADA. Flood depths are in the region of 300-800mm. A water level of 5.65m AOD is estimated at the point of water entry into the Site. However, flood levels generally vary between 5.26m AOD and 5.60m AOD across the developable area of the SADA. Access from Marsh Lane to the west remains flood free. Access south of the Site off Brook Furlong and Weaver Lane is flood free beyond the Order limits.

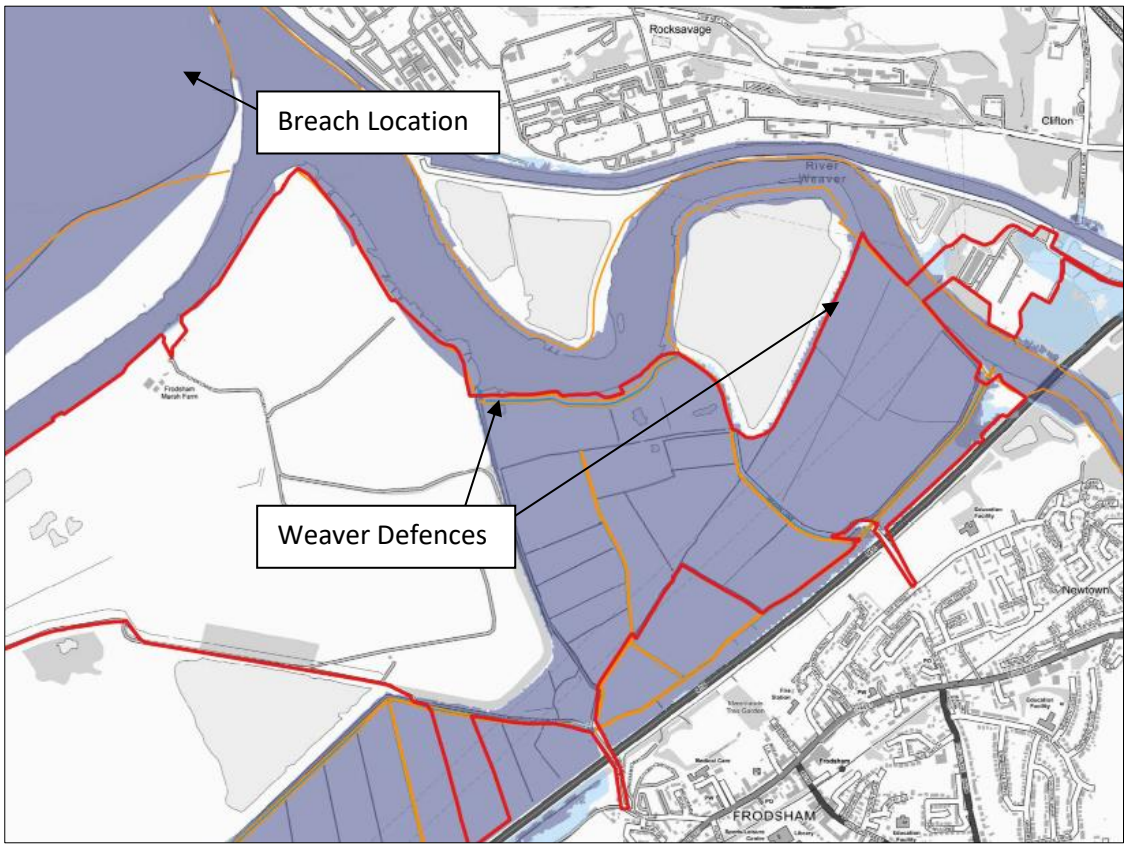
Breach

9.6.57 For the River Mersey Breach, there are flood defences along the River Mersey with secondary defences bordering the Site (along the River Weaver). For the purposes of this assessment, only a breach of the River Mersey defences in a tidal event has been considered, as the probability of a breach of the River

Mersey and River Weaver defences occurring simultaneously is very low. This approach has been agreed with the EA.

9.6.58 The proposed breach location is shown in **Image 9-5** below.

Image 9-5 – Mersey Breach Location



9.6.59 Flood depths of up to 370mm are estimated in the central section of the SADA during the 0.5% AEP present day breach event. A maximum water level of 5.27m AOD is estimated, however flood levels are generally less than 5m AOD in the location of the development.

9.6.60 During the 0.1% AEP present day breach event, a maximum water level of 5.63m AOD is estimated in the north-western extent of the SADA. A flood level of 5.33m AOD is estimated in the eastern extent of the SADA. Flood depths range from 350mm to 800mm.

9.6.61 The location of the grid connection points to the north of the River Weaver are shown to be flood free during all considered tidal events. Access from Marsh

Lane to the west remains flood free during all present-day tidal events. Access south of the Site off Brook Furlong and Weaver Lane is flood free beyond the Site boundary.

Baseline Assessment: Surface Water Risk

9.6.62 The EA 'Flood Risk from Surface Water' map indicates that the majority of the Site is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding.

9.6.63 There are isolated pockets of land across the Site shown to be at high, medium and low risk of surface water flooding. High risk is identified as having greater than 3.3% annual probability of flooding. Medium risk of surface water flooding is identified as having between a 3.3% and 1% annual probability of flooding. Low risk of surface water flooding is identified as having between a 1% and 0.1% annual probability of flooding.

9.6.64 The flood risk identified by EA mapping is limited in extent and is associated with surface water ponding within topographical low points on site.

9.6.65 The SFRA 'Historic Surface Water Flooding Incidents' map indicates that there are no records of surface water flooding at or near the Site.

9.6.66 There are no distinct flow routes in this area which would direct any potential surface water flooding towards the Site.

Baseline Assessment: Risk of flooding from sewers

9.6.67 Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

9.6.68 The Site is located in a rural area and there are no public sewers in the immediate vicinity of the Site. The risk of sewer flooding is therefore considered to be very low.

9.6.69 There are 2no. 900 l/s pumping stations on site serving Frodsham Marsh. The pumps at the Site are not in constant operation. The flood risk during a 'pump off' scenario or failure of the pumps have been considered in the fluvial flooding section.

Baseline Assessment: Groundwater Risk

9.6.70 Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

9.6.71 There are no records of groundwater flooding at or near to the Site. BGS borehole records indicate that the Site is underlain by superficial clay deposits. The impervious nature of the underlying deposits will limit the vertical migration of groundwater.

9.6.72 The Cheshire West and Chester Council Local Flood Risk Management Strategy states that *'there are no records of historic groundwater flooding that are considered as having significant harmful consequences'*. It can therefore be concluded that the risk of groundwater flooding is low.

Baseline Assessment: Risk of flooding from artificial sources

9.6.73 The EA 'Flood Risk from Reservoirs' map shows that there is no risk to the Site of flooding from reservoirs when adjacent river levels are normal. The eastern extent of the Site is shown at risk of flooding from a failure of reservoirs when river levels are high.

9.6.74 The EA state that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensure that reservoirs are inspected regularly and essential safety work is carried out.

Baseline Assessment: WFD waterbody classifications

9.6.75 The unnamed watercourses on Site have the potential to be affected by works undertaken as part of the Proposed Development. The watercourses in the eastern extent of the Site (and location of SADA) join the River Weaver in the south-easternmost extent of the Site (NGR: 352357, 379165). The River Weaver is classified as a WFD waterbody. The River Weaver flows north-west in this location and joins the Manchester Ship Canal. The watercourses in the western extent of the Site (NBBMA) also drain to the Manchester Ship Canal, a designated WFD waterbody. The Manchester Ship Canal joins the River Mersey approximately 12.7km north-west of the SADA, which is also classified as a WFD waterbody. The Hoolpool Gutter (WFD waterbody) is located approximately 2.45km west of the SADA, however it traverses the access road in which the Protos Private Wire Connection will be laid. The Private Wire Grid Connection terminates immediately prior to reaching Hoolpool Gutter

9.6.76 The WFD designation for the River Weaver is the Weaver (Dame to Frodsham) Water Body (Water body ID: GB112068060500), which has a catchment area of 61.276km^2. This waterbody has a moderate ecological classification, heavily modified hydromorphological classification, and the chemical classification is categorised as ‘fail’.

9.6.77 The Manchester Ship Canal is located within the North West AWB Management Catchment. The Waterbody ID for the Manchester Ship Canal Water Body is GB71210004, which has a length of 38.688km. This artificial waterbody has a moderate ecological classification, and the chemical classifications is categorised as ‘fail’.

9.6.78 The River Mersey is located within the North West Transitional and Coastal (TraC) Management Catchment. The waterbody ID for the Mersey Estuary is GB531206908100, which covers a surface area of 81.791 km^2. This waterbody has a moderate ecological classification, heavily modified

hydromorphological classification, and the chemical classification is categorised as 'fail'.

9.6.79 The WFD designation for the Hoolpool Gutter is the Peckmill Brook, Hoolpool Gutter at Ince Marshes Water Body (Waterbody ID: GB112068060330), which has a catchment area of 26.42km^2. This waterbody has a moderate ecological classification, and the chemical classifications is categorised as 'fail'.

9.6.80 The Site is located within a WFD designated groundwater body, namely the Wirral and West Cheshire Perm Triassic Sandstone Aquifers Water Body (Waterbody ID: GB41101G202600). This groundwater body has an overall poor status.

9.6.81 Specific parameter classifications for the aforementioned WFD waterbodies are included the associated WFD assessment, provided as **ES Volume 2 Appendix 9-2 Water Framework Directive Assessment [EN010153/DR/6.2].**

9.7 Future Baseline

9.7.1 Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require:

A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

Future Baseline Assessment: Fluvial & Tidal Risk

Ince and Frodsham

9.7.2 As the EA Ince and Frodsham model has not been simulated for the latest climate change allowances, a hydrology assessment has been undertaken,

and the impact of future climate change (CC) has been assessed during the 1% AEP event by increasing flows by 67% and 106%. Full details are included within the associated Ince and Frodsham Technical Note (**ES Vol 2 Appendix 9-4: Waterco Ince and Frodsham Technical Note [EN010153/DR/6.2])**

9.7.3 The climate change allowances of 67% and 106% have been applied to the EA's 1% AEP flows at the relevant cross-sections (MARG_0793 and TLUM_0396 detailed within **Image 9-3**). Water levels for the 1% AEP plus 67% CC and 1% AEP plus 106% CC have been derived using flow vs level trend lines. Results are included in **Table 9-10** below.

Table 9-10 Peak Water Levels - Climate Change Scenarios

Node	1% AEP + 67% CC		1% AEP + 106% CC	
	Peak Flow (m^3/s)	Extrapolated Peak Water Level from Trend Line (m AOD)	Peak Flow (m^3/s)	Extrapolated Peak Water Level from Trend Line (m AOD)
MARG_0793	0.39	4.74	0.48	4.84
TLUM_0396	0.06	4.76	0.08	4.89

9.7.4 A comparison of in-channel water levels and flood levels for the watercourses on site considered by the Ince and Frodsham model shows that no overtopping of the river banks occurs during all events up to and including the 1% AEP plus 106% CC event. The risk of flooding from the watercourses on site is therefore very low.

Manchester Ship Canal

9.7.5 When accounting for 30% CC on the 1% AEP fluvial event, a maximum water level of 6.08m AOD is estimated at NGR: 349758,380543 during normal operation. By comparing this water level with the minimum defence crest levels along the northern boundary (6.8m AOD), as well as site levels in the north-west, the Site is estimated to be flood free.

9.7.6 The water level remains unchanged during the gate closed scenario.

Lower Weaver

9.7.7 As per the EA correspondence **(ES Vol 2 Appendix 9-5 Consultation Responses [EN010153/DR/6.2])** *'The developer should use the 2080s higher central allowance for the climate change projections pertaining to peak river flow. The credible maximum scenario is the upper end allowance… Using the 2080s epoch would include an uplift of +67% on fluvial flows…The Upper scenario should be run as a sensitivity test.'*

9.7.8 **Table 9-9** details the climate change scenarios considered within this assessment and have been agreed with the EA**.**

Defended

9.7.9 When accounting for 67% climate change on the 1% AEP fluvial event, flood depths on the Site are generally varying from 740mm to 1.14m. A maximum water level of 5.73m AOD is estimated. The western extent of the Site is flood free.

9.7.10 Running a credible maximum scenario is required by the EA, so that the resilience of the Site to more severe climate change can be understood. The credible maximum scenario is represented by a 106% CC allowance. During this event, the maximum water level is estimated at 6.07m AOD. Flood depths during this event vary from 1.07m to 1.47m.

9.7.11 A joint probability scenario, combining the 1% AEP plus 67% CC fluvial scenario with the 0.5% AEP plus upper end sea level rise (to 2075), has also been assessed. During this scenario, a maximum water level of 6.29m AOD is estimated.

Breach Scenario

9.7.12 During the 1% AEP plus 67% CC defence breach event, maximum water levels across the Site are estimated to be 5.95m AOD. Flood depths vary from 0.96m to 1.36m.

9.7.13 When accounting for 106% CC on the 1% AEP plus 67% CC defence breach event, maximum water levels across the Site are estimated to be 6.23m AOD. Flood depths generally vary from 1.22m to 1.62m.

9.7.14 During the 1% AEP plus 67% CC fluvial event coinciding with a 0.5% AEP tidal event with CC up to the year 2075, a maximum water level of 6.58m AOD is estimated in the eastern extent of the SADA.

9.7.15 The Site access route beyond the Site is flood free during all considered fluvial flood events.

Impact Elsewhere

9.7.16 During both the defended and breach scenarios, there is no increase in flood risk elsewhere as a result of the Proposed Development scenario. This has been confirmed by detailed hydraulic modelling which considers the impact of the proposed solar module supports and PCU supports, CCTV columns and fencing (all structures within the flood extent). Full details are included in the **ES Vol 2 Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2].**

Mersey Estuary

9.7.17 The flood events (including climate change uplifts) detailed in **Table 9-11** below have been considered for the Mersey Estuary. As the operational lifetime of the development is limited to 40 years, which would be controlled via a requirement within the DCO, a climate change uplift to the year 2075 is proposed, which also allows for a 5 year delay in commencing the development.

Table 9-11 - Mersey Estuary Model Simulations

Watercourse / Source	Scenario	Event (% AEP)
Mersey Tidal	Defended	0.5% AEP (year 2024)
		0.1% AEP (year 2024)
		0.5% AEP Higher Central CC to the year 2075
		0.5% AEP Upper End CC to the year 2075
		0.5% AEP H++ Scenario (+1.9m of sea level rise)
	Breach (of the Mersey defences only)	0.5% AEP (year 2024)
		0.1% AEP (year 2024)
		0.5% AEP Higher Central CC to the year 2075
		0.5% AEP Upper End CC to the year 2075
		0.5% AEP H++ Scenario (+1.9m of sea level rise)

Defended

9.7.18 During the 0.5% AEP event with higher central CC up to the year 2075, the Site is estimated to flood with water levels up to 5.68m AOD at the point of water entry into the Site. Flood levels are generally in the region of 5.6m AOD to 5.43m AOD in the location of the development. When accounting for upper end CC to the year 2075, flood levels increase to 5.92m AOD at the point of water entry into the Site. Flood levels are generally in the region of 5.89m AOD across the majority of the Site. During the 0.5% AEP upper end CC event, the Site access off Marsh Lane to the west of the Site is estimated to flood.

9.7.19 A H++ scenario (+1.9m sea level rise allowance) has also been considered to provide sensitivity scenario modelling. During this event, a maximum water level of 8.57m AOD is estimated, and flood depths across the Site reach up to 3.96m. It is acknowledged that this scenario is necessary to understand the resilience of the Site to more severe climate change and does not inform design requirements.

Breach

9.7.20 During the 0.5% AEP breach event with higher central CC up to the year 2075, the Site is estimated to flood with a maximum water level of 5.76m AOD in the north-western extent of the SADA. Flood levels across the SADA are generally in the region of 5.49m AOD to 5.67m AOD. When accounting for upper end CC to the year 2075, flood levels increase to a maximum of 5.96m AOD. A H++ scenario (+1.9m sea level rise allowance) has also been considered for the breach event. During this event, flood levels are similar to that of the defended scenario. This is due to the significant amount of overtopping already occurring.

Impact Elsewhere

9.7.21 Model results show that during the River Mersey defended tidal and breach events, there is negligible change in flood risk offsite when the Proposed Development scenario (support columns, fencing and CCTV posts) is compared with the existing scenario. Full details are included in the **ES Vol 2 Appendix 9-3: Hydraulic Modelling Report [EN010153/DR/6.2].**

Future Baseline: Water Quality

9.7.22 It is assumed that the area would continue to remain in similar agricultural use and would remain relatively static in terms of the water quality baseline conditions. If the future predictions for increased flood risk occur the potential effects of increased flooding could impact water quality, such as sedimentation, pollutant runoff and contamination risk.

9.8 Incorporated Mitigation and Enhancement Measures

9.8.1 The design of the Proposed Development has involved an iterative process between the engineering and environmental teams, to ensure that potential impacts upon the baseline environment have been avoided or minimised wherever possible (prior to considering mitigation). Where significant effects are still likely, standard best practice measures are proposed which would be

incorporated into the construction, operation and decommissioning of the Proposed Development via the implementation of a series of certified 'control documents'. Control documents include the documents which provide specific and detailed practical controls on the Proposed Development. This includes documents such as the **outline Construction Environmental Management Plan (oCEMP) [EN010153/DR/7.5] outline Operational Environmental Management Plan (oOEMP) [EN010153/DR/7.6]** and **outline Decommissioning Environmental Management Plan (oDEMP) [EN010153/DR/7.7].** Reference should also be made to the Flood Warning and Evacuation Plan which is included as an appendix to **ES Volume 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2].**

9.8.2 Post-consent, these outline plans will be developed into full plans which must be in substantial accordance with the outlines and will require approval by CWaCC. The Proposed Development must be undertaken in accordance with the approved plans. This is secured via a Requirement in Schedule 2 of the **draft DCO [EN010153/DR/3.1]**.

9.8.3 The following sections outline the incorporated mitigation measures which would be committed to via the requirements of the draft DCO.

Construction Phase

9.8.4 An **outline Construction Environmental Management Plan (oCEMP) [EN010153/DR/7.5]** which outlines the principles, controls, and measures to be implemented during construction to reduce potential significant environmental effects from occurring. Measures to be adopted in the oCEMP or via parameters established via other control documents and DCO requirements are set out below.

Chemical and Fuel Spillages

9.8.5 Conventional good practice measures can be taken to prevent oil and hydrocarbons becoming pollutants, such as:

i) Maintenance of machinery and plant;
ii) Drip trays;
iii) Regular checking of machinery and plant for oil leaks;
iv) Correct storage facilities (a minimum of 10m from a watercourse);
v) Check for signs of wear and tear of tanks;
vi) Care with specific procedures when refuelling;
vii) Designated areas for refuelling;
viii) Emergency spill kit located near refuelling areas;
ix) Regular emptying of bunds; and
x) Tanks located in store areas to stop vandalism

9.8.6 As part of the CEMP a Environmental Incident Management and Pollution Prevention Plan (EIMP) will be produced prior to construction activities commencing. Training will be provided to site workers as part of induction processes and will be updated as necessary. This plan will contain information relating to the location of spill kits and any sensitive receptors, as well as the procedure for incident response.

Siltation and contamination of waterbodies

9.8.7 Unless otherwise stated, the following measures are secured pursuant to the **oCEMP**.

Open span bridge structures

9.8.8 The construction of watercourse crossings would be carried out during periods of low flow to reduce the risk of scour and erosion around structures and reduce runoff from the construction area. It should be noted however that minimal flow was observed within the watercourse channels on site therefore scour and erosion risk is considered to be minimal.

9.8.9 The footings will be positioned away from the bank edge to mitigate potential bank erosion.

9.8.10 Dry construction methods will be employed, with temporary sediment traps installed to hold any sediment that may be dislodged during pumping, preventing it from being deposited unnaturally downstream.

9.8.11 Silt netting will also be implemented within the channel to help capture any residual sediment.

Haul Roads

9.8.12 8.13 Temporary haul roads will be designed to minimise length while still serving their purpose. The gradient will be shallow to prevent increased runoff velocity, and if possible, bunds and / or discrete ditches will be constructed to intercept runoff. Haul roads will be regularly sprayed to control dust in dry and windy conditions. If any section of a haul road is hard-surfaced, it will be swept regularly to prevent the accumulation of dust and mud.

9.8.13 Plant and wheel washing will take place in designated locations. Dirty water will be contained within sealed storage tank(s) and will not be allowed to discharge into a watercourse or infiltrate to groundwater. Some proprietary vehicle washing systems offer a recycling facility, which filter and settle solids, with effluents being pumped back into the system. The solid waste materials from this process need to be treated as contaminated waste due to the high hydrocarbon content.

Stockpiles

9.8.14 Stockpiles will be located away from the watercourses or site drainage system to prevent leaching of contaminants. Protective coverings will help prevent runoff stripping a stockpile. Concrete would also be stored correctly to prevent release into watercourses and / or drains.

Piling Activity

9.8.15 A Piling Risk Assessment (PRA) would be produced, as informed by the current and proposed site investigations (detailed in **ES Vol 1 Chapter 10 Ground Conditions EN010153/DR/6.1**). The PRA would adopt the most

suitable piling technique which is likely to entail a method where generation of arisings is minimal (to reduce likelihood of exposure to construction workers) and methods to reduce the likelihood of contaminant remobilisation during piling which would be considered by CWaCC and EA.

Silt Fencing

9.8.16 The buffer areas described above will provide an area adjacent to watercourses where any overland flows would be intercepted by retained vegetation, reducing the potential for silt laden runoff polluting watercourses. However, where construction works encroaches into these buffer areas or where there is considered to be an increased risk for potential suspended sediment pollution (e.g. where vegetation cover is poor, there are clear drainage pathways), watercourses will be separated from area of construction activity by barriers (e.g. silt fences). These measures would prevent suspended silt within surface runoff entering the watercourse. Furthermore, the Site is relatively flat and therefore the likelihood of surface water runoff (overland flow routes) arising is very low.

Construction of NBBMA

9.8.17 The canal pools to the north of Cell 3 may be drained to facilitate the construction of the mitigation area in Cell 3. If this is undertaken a settlement tank will be used to allow for suspended solids in the drained water to settle out prior to discharge to the Manchester Ship Canal. As part of the drainage works a New Zealand Pigmy Weed control programme would also be implemented to ensure that New Zealand Pigmy Weed is not released into the Manchester Ship Canal.

9.8.18 A Materials Management Plan (MMP) or a Deposit for Recovery (DfR) Permit the excavation and reuse of soils as part of the works for the NBBMA will be required. The applications for these consents / permits would be supported by appropriate controlled water risk assessments and groundwater and surface water monitoring programme as approved by the regulators. Such

documentation may include or be supported by a Soil Resources Management Plant (SRMP) which would detail recovery, segregation, testing and replacement works and be approved by the regulators prior to implementation. An **Outline Soils Resources Management Plan [EN010153/DR/7.10]** is provided with the application. This would detail that any dredging arisings would be replaced under the existing surface soils (following careful recovery) to ensure surface ground conditions remain similar to baseline conditions. The measures implemented via the agreed plans would ensure that surface and groundwater would not be adversely impacted from the movement of the soils.

9.8.19 Measures outlined above in relation to avoiding chemical, hydrocarbon or suspended sediment pollution would also be employed whilst engineering the NBBMA. As soon as possible the area would be reseeded with the prescribed grassland seed mix for the intended habitats.

Private wire connection within the existing access road

9.8.20 Trenching works for the installation of internal cabling will be conducted in small sections. This approach is designed to minimise soil disturbance by limiting the amount of exposed ground at any given time, thus reducing the risk of erosion and sedimentation to nearby watercourses.

9.8.21 Retaining the private wire connection within the existing access roads would avoid disturbing any adjacent drainage ditches. Furthermore, where the construction within the access road is located adjacent to watercourse (i.e. within 10m) silt fences would be erected to prevent suspended silt within surface runoff entering the watercourse.

Spreading of Invasive Species

9.8.22 Where invasive species are identified, their removal will be undertaken by a suitably qualified and experienced person. Appropriately experienced contractors would be appointed to ensure that suitable measures are put in place to prevent further distribution of invasive plants in the local area.

Removal and disposal would take place in accordance with the EA guidance document Treatment and Disposal of Invasive Non-native Plants: RPS 178 (April 2019). Where invasive non-native species are identified, efforts would be made not to spread these species within the Site or to accidentally spread them to other sites. Relevant biosecurity measures would be implemented to reduce this risk and to reduce the risk of introducing invasive non-native species to the Site. The **oCEMP [EN010153/DR/7.5]** outlines the requirement for an Invasive Non-Native Species Management Plan (INNSMP) to be prepared prior to the commencement of construction.

Flood Warnings & Evacuation

9.8.23 Flood alerts and warnings cover this area. Site management would register to receive flood warnings and alerts, and this would form part of the operational site procedures set out in the **oCEMP [EN010153/DR/7.5]**. Flood warnings and flood alerts are a free service that provides prior warning of a flood event.

9.8.24 When a flood warning is in place, any construction works would not take place.

9.8.25 Where flooding occurs without warning when the Site is staffed, evacuation would be undertaken via either Brook Furlong or Weaver Lane. The applicable evacuation route depends on the operative's position on site at the time of flooding.

9.8.26 During the present day fluvial and tidal scenarios, Brook Furlong and Weaver Lane are flood free, as is the Site access off Marsh Lane to the west. As such, it is considered that a flood free safe access / egress route would be available during the construction phase.

9.8.27 Further detail on flood evacuation procedures are provided in the Flood Warning & Evacuation Plan provided within **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**.

Operational Phase

9.8.28 The design of the Proposed Development integrates a number of measures which would mitigate against impacts arising from flood risk and would also prevent impacts on surface and groundwater quality. Several of these measures are controlled by virtue of the design parameters set out in **ES Vol 1 Chapter 2.0 The Proposed Development [EN010153/DR/6.1].**

9.8.29 This includes the following buffer zones which will be adopted and would help to mitigate impacts to the water environment:

i) A 10m buffer between fencing surrounding solar PV modules and non-tidal watercourses (for example all watercourses within the Site);
ii) An 8m buffer surrounding retained ponds and reedbeds; and
iii) A 16m buffer between fencing surrounding solar PV modules and tidal watercourse defence structures (for example the River Weaver defences).

9.8.30 Furthermore, an **outline Operational Environmental Management Plan (oOEMP) [EN010153/DR/7.6]** and **outline Battery Safety Management Plan (oBSMP) [EN010153/DR/7.8]** are provided with the DCO application. These outline the principles, controls, and measures to be implemented during operation to reduce potential significant environmental effects from occurring, including for any periodic replacement campaigns where there would be a need to apply mitigation which could be similar in nature to the construction phase . A detailed OEMP and BSMP would be produced by the operator of the Proposed Development. This would be a Requirement of the DCO and the plans would be prepared following grant of the DCO and prior to the start of commissioning. The OEMP and BSMP would be in substantial accordance with the oOEMP and oBSMP.

9.8.31 The following sections outline some of the incorporated mitigation related to the operational phase of the development.

Surface Water Drainage

9.8.32 The proposed ground-mounted solar arrays will not significantly alter the existing surface water drainage regime. Runoff from the ground-mounted solar arrays will continue to infiltrate into the permeable ground below. Surface water runoff from the proposed BESS compound and substation will discharge to an adjacent watercourse at a limited greenfield discharge rate. Attenuation will be provided in the sub-grade of the compound's stone surfacing and will be sized to accommodate the 1 in 100 year plus 45% CC event. The **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]** provides further detail and drainage calculations for the surface water management within the Frodsham Solar Substation and the BESS.

9.8.33 The access roads and any parking areas will be formed from permeable stone surfacing, which will provide sufficient treatment for total suspended solids, metals and hydrocarbons. Filter drains will also be accommodated at road sides to intercept any potential runoff. The mitigation indices associated with permeable surfacing is included within the FRA & Drainage Strategy (**ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**).

9.8.34 Runoff from the panels will result in negligible erosion at the base of each panel due to proposed land use comprising wildflower grassland. The flat nature of the Site would prevent any overland flows from forming (prior to vegetation establishing) and minimise siltation to watercourses. The panels will be laid with rainwater gaps between the rows of panels as to allow runoff from the panels to distribute to the ground below.

Flood Risk

9.8.35 Damage to infrastructure from flooding will be mitigated through design and layout considerations.

9.8.36 A design level of 6.52m AOD will be adopted for all infrastructure, including the solar modules. This level provides 630mm freeboard above the 0.5% AEP plus Upper End CC (2075) defended tidal flood level. A design level of 6.52m AOD is also above the fluvial 1% AEP plus 106% CC flood level (for the defended and breach event).

9.8.37 The maximum water level during the 0.5% AEP (year 2075) upper end breach event is 5.96m AOD (worst case tidal event considered for the year 2075, with exclusion of the H++ scenario). The design level of 6.52m AOD is therefore above tidal breach flood levels with climate change to the year 2075.

9.8.38 The design flood level of 6.52m AOD will ensure that all equipment can remain operational in times of flooding (during all considered events with exclusion of the H++ tidal scenario).

9.8.39 New and replacement access road crossings over watercourses will be required. Indicative plans identifying the watercourse crossing locations are provided in **ES Vol 2 Appendix 2-1 [EN010153/DR/6.2].** 3no. Main River crossings are proposed (plan reference CP17, CP14 and CP22), with CP14 and CP22 comprising existing crossings which will be replaced. Multiple other crossing points are proposed over ordinary watercourses.

9.8.40 The new crossings will be in the form of open span bridge structures which will not impact on the channel capacity.

9.8.41 The proposed bridge soffit levels will be set 600mm above the 1% AEP plus 67% CC in-channel water level to account for freeboard. This will also place be bridge soffits above the 1% AEP plus 106% CC in-channel water level. The proposed access bridge soffit levels have been included in **Table 9-12 below.**

Table 9-12 Proposed Access Bridge Soffit Levels

Access Bridge	Proposed Soffit Level including 600mm freeboard (m AOD)
CP14	5.34
CP17	
CP22	5.36

Flood Warnings & Evacuation

9.8.42 Flood alerts and warnings cover this area. Site management would register to receive flood warnings and alerts, and this would form part of the operational site procedures set out in the oOEMP [EN010153/DR/7.6] Flood warnings and flood alerts are a free service that provides prior warning of a flood event.

9.8.43 It is expected that there would be 10 full time equivalent (FTE) roles during the Operational Phase covering site maintenance, management and administrative roles, and land management including landscape maintenance and agriculture. However, the Proposed Development will not be permanently staffed, but would be temporarily occupied during periods when landscape maintenance, equipment servicing and repairs are being undertaken. There would also be occasional visits by control and administration staff.

9.8.44 During its operational phase, maintenance visits would not be undertaken when a flood warning is in force. If site operatives are on site upon receipt of flood warning, they should leave the Site immediately ensuring it is secured on leaving. The Proposed Development can be operated remotely, and routine maintenance works can be temporarily suspended. Once off-site, travel routes and public transport schedules should be checked (for any road closures, cancelations etc.) to ensure safe travel to a place of residence.

9.8.45 Where flooding occurs without warning when the Site is staffed, evacuation would be undertaken via either Brook Furlong or Weaver Lane. The

applicable evacuation route depends on the operative's position on site at the time of flooding.

9.8.46 All inverter / transformer substations which are distributed across the Site have been designed with a floor level above flood levels. Each inverter / transformer substation therefore provides an area of safe refuge should flooding occur without warning and evacuation is not possible. Site operatives would remain in the place of safe refuge until floodwater recedes. The elevated western extent of the Site (Frodsham wind farm) also provides a place of refuge.

9.8.47 The Flood Warning & Evacuation Plan includes full details on preparing and responding to a flood event and is provided within **ES Vol 2 Appendix 9-1 Flood Risk Assessment and Drainage Strategy [EN010153/DR/6.2]**.

Firewater Management

9.8.48 The base of the permeable stone surfacing in the BESS will be lined with an impermeable geotextile.

9.8.49 An internal fire suppression system (sprinklers) will be built into the interior of each battery container unit.

9.8.50 A designated drain (gully) on the concrete slab beneath each battery container unit will direct the fire water into a designated piped drain. The piped drain will discharge to a lined fire water lagoon within the BESS compound.

9.8.51 A shut off valve will be placed on the fire water lagoon outfall and will be automated (set in the off position when fire water sprinklers are activated). This will prevent discharge of fire water to the wider water environment. An outfall from the fire water lagoon to the Site drainage system is required to ensure the lagoon does not fill up with rainwater (ensuring the lagoon is empty and ready to accommodate fire water).

9.8.52 Following a fire, contaminated flows will be collected from the fire water lagoon and transported by tanker to an appropriate treatment facility. Full

details of firewater management will be provided in the surface water drainage strategy required by the DCO and in the battery safety management plan produced pursuant to the Outline Battery Safety Management Plan [EN010153/DR/7.8].

Operational Maintenance

9.8.53 During the operation phase, there would be renewal of equipment across the Site over the lifetime of development. Measures detailed in the CEMP for control of pollution would be integrated into the Operational Environmental Management Plan (OEMP) for major maintenance works such as an Environmental Incident Management and Pollution Prevention Plan (EIMP).

Decommissioning Phase

9.8.54 It is anticipated that the impacts during the decommissioning phase effects would be of a similar nature to those experienced during the construction phase, albeit they are likely to be of a lesser magnitude. Furthermore, the impacts associated with the creation of the NBBMA would not occur as this area would be left in situ at the point of decommissioning.

9.8.55 However, an **outline Decommissioning Environmental Management Plan (oDEMP) [EN010153/DR/7.7]** will be provided with the DCO application. This will outline the principles, controls, and measures to be implemented during decommissioning to reduce potential significant environmental effects from occurring. A detailed DEMP would be produced by the contractor undertaking the decommissioning works. This would be a Requirement of the DCO and the DEMP would be prepared prior to the start of decommissioning. The DEMP would be in substantial accordance with the oDEMP **[EN010153/DR/7.7]**.

9.9 Assessment of Likely Impacts and Effects

Identified Receptors

9.9.1 Receptors identified from the baseline conditions assessment which could be potentially susceptible to environmental effects from flooding and drainage during the construction, operational and decommissioning phases of the Proposed Development include:

i) Watercourses / waterbodies within and adjacent to the Site
ii) Groundwater – Secondary Undifferentiated Aquifer
iii) Aquatic life
iv) Future infrastructure associated with the development
v) Adjacent land uses
vi) Designated sites

9.9.2 **Table 9-13** details the list of receptors applicable to the Proposed Development and their sensitivity.

Table 9-13: Sensitivity of receptors

Receptor	Sensitivity
Surface Water	
Ordinary watercourses (ditches) on site	Medium – hydrologically linked to The River Weaver which is a WFD waterbody with a 'moderate' ecological classification and a 'fail' chemical classification.
Ordinary watercourses (ditches) adjacent to site along the Main Access Road in Ince Marshes	Medium – hydrologically linked to the Hoolpool Gutter which is a WFD waterbody with a 'moderate' ecological classification and a 'fail' chemical classification.
Main Rivers on site	Medium - May support a small/limited population of protected species. Hydrologically linked to The River Weaver which is a WFD waterbody with a 'moderate' ecological classification and a 'fail' chemical classification..
River Weaver	Medium - A watercourse classed as moderate in accordance with the WFD. May support a small/limited population of protected species.

Receptor	Sensitivity
Manchester Ship Canal	Medium - A watercourse classed as moderate in accordance with the WFD.
Mersey Estuary	High - A watercourse / feature designated under EC or UK habitat legislation (Mersey Estuary SSSI & Ramsar Site & SPA)
Hoolpool Gutter	Medium - A watercourse classed as moderate in accordance with the WFD.
Groundwater	
Groundwater (Superficial)	Medium - A Secondary Undifferentiated Aquifer with limited permeability. No local groundwater abstractors.
Groundwater (Bedrock)	High - A Principal Aquifer.
Flood Risk	
Future infrastructure associated with the development.	High – Proposed development is classed as essential infrastructure and is required to be in operation in times of flood.
Adjacent land uses	Medium – Some adjacent land, including access routes, in Flood Zone 2 and 3a. Low vulnerability agricultural uses. Adjacent M56 and urban area of Frodsham in Flood Zone 1.
Site users/operatives	High – Part of site in Flood Zone 3a.

Potential Impacts

Construction Phase

9.9.3 Construction activities are likely to generate impacts which have the potential to affect the water environment in the absence of the measures which are described in the **oCEMP [EN010153/DR/7.5]**

9.9.4 The following adverse impacts may occur without appropriate mitigation:

i) **Siltation and contamination of Watercourses/Waterbodies** – Mobilisation of sediment (and potential pollutants) through the following activities:

a. Construction of open span bridge structures
b. Construction of the OHL Trident poles on the north side of the River Weaver
c. Construction and use of haul roads.
d. Increased erosion of temporary stockpiles
e. Piling activity
f. Extensive earthworks associated with the construction of the NBBMA, including the creation of additional scrapes and islands and re-engineering of existing ponds.
g. Construction of private wire connection within the existing access road.

ii) **Chemical / Fuel Spillages and Contaminated Runoff** - Accidental spillage of pollutants such as fuel oils, concrete/cement, suspended solids from run off etc. This could affect the water quality in the receiving waterbodies or groundwater if pollution is mobilised. Where fuels and chemicals reach a waterbody, there is a potential for effects on water quality, which can affect local flora and fauna

iii) **Changes in Flood Risk –** Changes in land use to create access tracks and site compound and storage facilities may alter surface water runoff from the Site. Ground compaction from heavy machinery operations can also result in increased surface water runoff.

iv) **Spreading of Invasive Species –** Incorrect clearance, removal and disposal of the New Zealand Pigmyweed in the NBBMA can result in unintentional spreading of invasive species which may migrate and colonise downstream banks and adversely affect native habitats, including the new proposed water storage area. There is also potential

for non-native invasive species may be unintentionally introduced to the Study Area through contaminated equipment. This can often physically alter aquatic habitats.

v) **Pollution of groundwater** – Piling operations for Solar PV modules and Construction of private wire connection can disturb the soil and mobilise contaminants, which can result in leaching of heavy metals and hydrocarbons to the groundwater. Excavation works in the NBBMA.

9.9.5 The potential effect on receptors during the construction phase are considered within the **Table 9-14** below and takes account of the Incorporated mitigation measures (as detailed previously in Section 9.8).

Table 9-14 – Significance of Construction Effects

Potential Impact	Receptors (Sensitivity)	Magnitude of Impact (with Incorporated Mitigation Applied)	Resulting Level of Effect	Significance
Siltation and contamination of waterbodies	Ordinary Watercourses on & adjacent to the Site (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Main Rivers on Site (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	River Weaver (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Hoolpool Gutter (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Mersey Estuary (High)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Minor Adverse	Not significant
	Groundwater (superficial) (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed	Negligible	Not significant

Potential Impact	Receptors (Sensitivity)	Magnitude of Impact (with Incorporated Mitigation Applied)	Resulting Level of Effect	Significance
		Development is unlikely to affect the integrity of the water environment		
	Groundwater (bedrock) (High)	Negligible - When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Minor Adverse	Not significant
	Manchester Ship Canal (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
Chemical / Fuel Spillages and Contaminated Runoff	Ordinary Watercourses on & adjacent to the Site (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Main Rivers on Site (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	River Weaver (Medium)	Negligible - When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant

Potential Impact	Receptors (Sensitivity)	Magnitude of Impact (with Incorporated Mitigation Applied)	Resulting Level of Effect	Significance
	Hoolpool Gutter (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Mersey Estuary (High)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Minor Adverse	Not significant
	Groundwater (superficial) (Medium)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant
	Groundwater (bedrock) (High)	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Minor Adverse	Not significant
	Manchester Ship Canal (Medium	Negligible- When accounting for the mitigation proposed, which will be implemented within the CEMP, the Proposed Development is unlikely to affect the integrity of the water environment	Negligible	Not significant

Potential Impact	Receptors (Sensitivity)	Magnitude of Impact (with Incorporated Mitigation Applied)	Resulting Level of Effect	Significance
Changes in Flood Risk	Ordinary Watercourses on Site (Medium)	Minor –Flooding during the construction period is unlikely and measure would be in place to ensure the safety of operated. Any effects would be temporary in nature and there will be no overall change in flood risk elsewhere.	Minor Adverse	Not significant
	Main Rivers on site (Medium)	Minor –Flooding during the construction period is unlikely and measure would be in place to ensure the safety of operated. Any effects would be temporary in nature and there will be no overall change in flood risk elsewhere.	Minor Adverse	Not significant
	Adjacent Land use (Medium)	Minor –Flooding during the construction period is unlikely and measure would be in place to ensure the safety of operated. Any effects would be temporary in nature and there will be no overall change in flood risk elsewhere.	Minor Adverse	Not significant
Spreading of Invasive Species	Ordinary Watercourses on Site (Medium)	Negligible – By implementing specific biosecurity measures and following the eradication strategy for NZPW, the integrity of the water environment is unlikely to be affected.	Negligible	Not significant
	Main Rivers on site (Medium)	Negligible – By implementing specific biosecurity measures and following the eradication strategy for NZPW, the integrity of the water environment is unlikely to be affected.	Negligible	Not significant

Potential Impact	Receptors (Sensitivity)	Magnitude of Impact (with Incorporated Mitigation Applied)	Resulting Level of Effect	Significance
	Adjacent Land use (Medium)	Negligible – By implementing specific biosecurity measures and following the eradication strategy for NZPW, the integrity of adjacent land use is unlikely to be affected.	Negligible	Not significant
Pollution of groundwater	Groundwater (bedrock) (High)	Minor - Potential for minor effects on the below aquifer from piling activity. The excavations within the NBBMA are only to be shallow (depth of circa 1m) and to be located above the water table	Minor Adverse	Not significant
	Groundwater (superficial) (Medium)	Minor - Potential for minor effects on the below aquifer from piling activity. The excavations within the NBBMA are only to be shallow (depth of circa 1m) and to be located above the water table	Minor Adverse	Not significant

Operational Phase

9.9.6 During the operational phase, the following adverse impacts may occur without mitigation:

i. **Increased flood risk from runoff -** A change of the hydrological regime at the Site i.e., installation of the BESS and substation compounds could lead to an increase in surface water runoff rates and volumes

ii. **Siltation of watercourses** – Suspended solids could be conveyed in the drainage system serving the BESS and substation compounds. The replacement of PV solar modules during maintenance or following a flood event could have impacts similar in nature to the construction phase, albeit affecting a smaller area of the Site.

iii. Damage to on-site infrastructure from fluvial and tidal flooding

iv. Contaminated firewater runoff - The BESS introduces the potential risk of contaminated fire water runoff (in the event of a fire).

v. **Changes to channel morphology** – Proposed access watercourse crossings could result in changes to channel morphology.

9.9.7 There is also potential for the following beneficial impacts to occur during the operational phase:

i. **Reduced chemical loading** - change in land use from arable land to grassland pasture will result in cessation of nitrate, pesticide, herbicide and insecticide applications on arable fields and therefore chemical loading in watercourses.

ii. **Reduced Siltation of Watercourses -** The cessation of ploughing activity could have a positive impact by reducing soil erosion and sediment runoff to nearby watercourses.

9.9.8 During the operational phase, there would be renewal of equipment across the Site over the lifetime of development. Measures detailed in the CEMP for control of pollution would be integrated into the Operational Environmental Management Plan (OEMP).

9.9.9 The potential impact on receptors during the operational phase are considered within **Table 9-15** below and takes account of the Incorporated mitigation measures (as detailed previously in Section 9.8).

Table 9-15 – Significance of Operational Effects

Potential Impact	Receptor (Sensitivity)	Magnitude of Impact (with Mitigation Applied)	Level of Effect	Significance
Increased flood risk from runoff	Ordinary Watercourses on Site (Medium)	Negligible - Runoff from the ground mounted solar arrays will continue to infiltrate as per the current scenario and the BESS compound and substation will be formally drained at the existing greenfield runoff rate. Therefore, there will be negligible impact on flood risk elsewhere.	Negligible	Not Significant
	Main Rivers on Site (Medium)	Negligible - Runoff from the ground mounted solar arrays will continue to infiltrate as per the current scenario and the BESS compound and substation will be formally drained at the existing greenfield runoff rate. Therefore, there will be negligible impact on flood risk elsewhere.	Negligible	Not Significant
	River Weaver (Medium)	Negligible - Runoff from the ground mounted solar arrays will continue to infiltrate as per the current scenario and the BESS compound and substation will be formally drained at the existing greenfield runoff rate. Therefore, there will be negligible impact on flood risk elsewhere.	Negligible	Not Significant
	Manchester Ship Canal (Medium)	Negligible - Runoff from the ground mounted solar arrays will continue to infiltrate as per the current scenario and the BESS compound and substation will be formally drained at the existing greenfield runoff rate. Therefore, there will be negligible impact on flood risk elsewhere.	Negligible	Not Significant
	River Mersey (High)	Negligible - Runoff from the ground mounted solar arrays will continue to infiltrate to permeable ground below as per the current scenario and the BESS compound and substation will be formally drained at the existing greenfield runoff rate. Therefore, there will be negligible impact on flood risk elsewhere.	Negligible	Not Significant

Potential Impact	Receptor (Sensitivity)	Magnitude of Impact (with Mitigation Applied)	Level of Effect	Significance
Siltation of watercourses	Ordinary Watercourses on Site (Medium)	Minor beneficial – no increase in sediment loading from development due to proposed mitigation but a reduction from the cessation of ploughing activity on arable land. This therefore results in a minor improvement to water quality.	Minor beneficial	Not Significant
	Main Rivers on Site (Medium)	Minor beneficial – no increase in sediment loading from development due to proposed mitigation but a reduction from the cessation of ploughing activity on arable land. This therefore results in a minor improvement to water quality.	Minor beneficial	Not Significant
	Mersey Estuary (High)	Minor beneficial – no increase in sediment loading from development due to proposed mitigation but a reduction from the cessation of ploughing activity on arable land. This therefore results in a minor improvement to water quality.	Moderate or Minor beneficial	Not Significant
	River Weaver (Medium)	Minor beneficial – no increase in sediment loading from development due to proposed mitigation but a reduction from the cessation of ploughing activity on arable land. This therefore results in a minor improvement to water quality.	Minor beneficial	Not Significant
Contaminated firewater runoff	Ordinary Watercourses on Site (Medium)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Negligible	Not Significant

Potential Impact	Receptor (Sensitivity)	Magnitude of Impact (with Mitigation Applied)	Level of Effect	Significance
	Main Rivers on Site (Medium)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Negligible	Not Significant
	River Weaver (Medium)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Negligible	Not Significant
	Manchester Ship Canal (Medium)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Negligible	Not Significant
	River Mersey (High)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Minor adverse	Not Significant
	Groundwater (bedrock)(High)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Minor adverse	Not Significant
	Groundwater (superficial) (Medium)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of the water environment is unlikely to be affected.	Negligible	Not Significant
Changes to channel morphology	Ordinary Watercourses on Site (Medium)	Negligible - new crossings will be in the form of an open span prefabricated bridge structure and therefore unlikely to affect the integrity of the water environment	Negligible	Not Significant

Potential Impact	Receptor (Sensitivity)	Magnitude of Impact (with Mitigation Applied)	Level of Effect	Significance
	Main Rivers on Site (Medium)	Negligible - new crossings will be in the form of an open span prefabricated bridge structure and therefore unlikely to affect the integrity of the water environment	Negligible	Not Significant
Chemical Loading	Ordinary Watercourses on Site (Medium)	Minor beneficial – Reduced chemical loading from cessation of pesticide, herbicide and insecticide applications will contribute to improvement in water quality	Minor beneficial	Not Significant
	Main Rivers on Site (Medium)	Minor beneficial - Reduced chemical loading from cessation of pesticide, herbicide and insecticide applications will contribute to improvement in water quality	Minor beneficial	Not Significant
	River Weaver (Medium)	Minor beneficial - Reduced chemical loading from cessation of pesticide, herbicide and insecticide applications will contribute to improvement of water quality of watercourses on site and subsequent WFD classification of this waterbody	Minor beneficial	Not Significant
	Manchester Ship Canal (Medium)	Minor beneficial - Reduced chemical loading from cessation of pesticide, herbicide and insecticide applications will contribute to improvement of water quality of watercourses on site and subsequent WFD classification of this waterbody	Minor beneficial	Not Significant

Potential Impact	Receptor (Sensitivity)	Magnitude of Impact (with Mitigation Applied)	Level of Effect	Significance
	River Mersey (High)	Minor beneficial - Reduced chemical loading from cessation of pesticide, herbicide and insecticide applications will contribute to improvement of water quality of watercourses on site and subsequent WFD classification of this waterbody	Moderate to Minor beneficial	Not Significant
Flood risk from rivers, sea and surface water	Site Users/ Operatives (High)	Negligible - When a flood warning is in place, maintenance visits will not be undertaken, and the Site will be operated remotely.	Minor Adverse	Not Significant
	Future infrastructure associated with the development (High)	Negligible – when accounting for the proposed mitigation and design considerations, the integrity of future infrastructure is unlikely to be affected.	Minor adverse	Not Significant
	Adjacent Land Uses (Medium)	Negligible – Hydraulic modelling shows there is negligible change in flood risk offsite when the Proposed Development scenario (support columns, fencing and CCTV posts) is compared with the existing scenario.	Negligible	Not Significant

Decommissioning Phase

9.9.10 During the decommissioning phase, the impacts on the water environment are similar to the construction phase impacts **(Table 9-14)** however, are likely to be reduced as certain elements such as the NBBMA would remain in situ.

9.10 Additional Mitigation, Enhancement and Monitoring

9.10.1 Additional mitigation and enhancement measures are not required as potentially significant adverse effects are not identified. However, in any event, monitoring measures are proposed as set out below.

Monitoring

9.10.2 Surface water sampling and analysis will be undertaken so that a water quality baseline can be established prior to the construction works commencing. It would also be prudent to confirm water quality data during and immediately following completion of the works, to highlight that the construction phase has not had a detrimental effect on water quality. Regular monitoring, recording and reporting of water quality at key locations will be agreed as part of the Construction Groundwater and Surface Water Management Plan .

9.10.3 This plan will also provide for additional monitoring to include groundwater quality will be undertaken prior to, during and for a period of time (up to one year) after of the groundworks relating to the NBBMA where significant earthworks will take place..

9.11 Residual Effects

9.11.1 No significant residual adverse effects are predicted to occur in relation to flood risk, drainage or surface water as a result of the construction, operation or decommissioning of the Proposed Development.

9.12 Inter-Project Cumulative Effects Assessment

9.12.1 Cumulative effects can result from a combination of impacts, which on their own may not be significant but when combined with others, could generate significant effects.

9.12.2 The approach to the Cumulative Effects Assessment is described in **ES Vol 1 Chapter 4 Methodology [EN010153/DR/6.1].** A short list of projects which the Proposed Development could have potential significant cumulative environmental effects with has been prepared, see **ES Vol 2 Appendix 4-4 Short List of other 'reasonably foreseeable' developments [EN010153/DR/6.1]**. The location of the projects is shown on **ES Vol 3 Figure 4-3: Short List Cumulative Schemes – 1km [EN010153/DR/6.3].**

9.12.3 As set out in **ES Vol 1 Chapter 4 Methodology [EN010153/DR/6.1]** there are a number of development schemes located within Protos, a significant development site with the benefit of planning permissions for a range of energy generation and resource management businesses. Due to the proximity of the developments to one another, they have been collectively assessed below. Where specific cumulative effects could arise from an individual project these have been expanded on.

9.12.4 Project Ref 16 (100MW BESS) and Ref 17 (135Kv substation) have also been considered together due to their proximity and the interrelationship of the two projects.

Halton Schemes - Ref 16 (100MW BESS) and Ref 17 (135Kv substation)

9.12.5 The development is located to the north of the Weaver Navigation, and as such is hydrologically separated from the Site. As such it is considered unlikely that there would be significant cumulative effects.

Protos Schemes – Ref 20 (Ince Biopower CO2); Ref 27 (Plastics Recycling Facility); Ref 25 & 28 (Hydrogen Production Facility); Ref 31

(Waste Recycling and hydrogen refuelling); 34 (Standby Electricity Generating Plant); Ref 35 (Post Combustion CO2 Capture Facility); Ref 81 (Protos West AGI)

Construction

9.12.6 Developments within Protos are all subject to conditions which require a Construction Environmental Management Plan (CEMP) to be prepared and implemented which combined with the distance from the Proposed Development means that there is unlikely to be significant effects during the construction phase.

Operation

9.12.7 A strategic surface water drainage design has been implemented at Protos to manage surface water flows at greenfield runoff rates. The permissions within Protos are also subject to specified development levels in order to mitigate against flood risk. As such it is considered unlikely that there would be significant cumulative effects with the developments at Protos.

Decommissioning

9.12.8 The applications are for permanent development and as such a detailed assessment of decommissioning has not been provided.

Ref 33 (Encirc Automated Warehouse)

Construction

9.12.9 This development is subject to conditions which require a Construction Environmental Management Plan (CEMP) to be prepared and implemented, which, combined with the distance from the Proposed Development, means that there are unlikely to be significant effects during the construction phase.

Operation

9.12.10 Surface water flows will be restricted to greenfield runoff rates. A Flood Risk Assessment [FRA] has been submitted alongside the planning application and demonstrates that there will be no net loss to floodplain storage resulting from the development, the proposals will not increase flood risk elsewhere, and there will be no adverse effect on the operational functions of any existing flood defence infrastructure. As such it is considered unlikely that there would be significant cumulative effects with this development.

Decommissioning

9.12.11 The application is for permanent development and as such a detailed assessment of decommissioning has not been provided. Any effects associated with decommissioning works are considered likely to be similar in nature to construction phase effects and will be managed by a Decommissioning Environmental Management Plan. As a result, it is considered unlikely that there would be significant cumulative effects.

Ref 32 (Hydrogen Production Facility)

9.12.12 The distance from this development to the Proposed Development, in particular the SADA, along with the lack of hydrological connectivity is such that it is considered unlikely that there would be significant cumulative effects.

Ref 37 (HyNet Carbon Dioxide Pipeline)

Construction

9.12.13 The DCO for this development includes a requirement which specifies the provision of a Construction Environmental Management Plan (CEMP) to be prepared and implemented which, combined with the distance from the Proposed Development, means that there is unlikely to be significant cumulative effects during the construction phase.

Operation

9.12.14 The Applicant for this development will develop an Operations and Maintenance Environment Management Plan, as included as a Requirement of the DCO. On the basis that the project is for a buried pipeline, and implementation of the Operations and Maintenance Environment Management Plan, no significant operational effects are anticipated from the development.

Decommissioning

9.12.15 Any effects associated with decommissioning works are considered likely to be similar in nature to construction phase effects and will be managed by a Decommissioning Environmental Management Plan, as a requirement of the DCO for this development. . As a result, it is considered unlikely that there would be significant cumulative effects.

Ref 38 (HyNet Hydrogen Pipeline)

Construction

9.12.16 The PEIR for the development includes an outline Construction Environmental Management Plan (oCEMP). No significant effects on the water environment have been identified during the construction phase, with the exception of material storage areas at Acton Bridge (South Corridor) and at Eastford Road (Warrington Spur). These are located a significant distance from the Order Limits. Implementation of the CEMPs on the respective projects means it is unlikely that significant cumulative effects would arise should then be constructed in the same time period.

Operation

9.12.17 No significant effects on the water environment have been identified within the PEIR during the operational phase. It is therefore considered unlikely that there would be significant cumulative effects.

Decommissioning

9.12.18 Any effects associated with decommissioning works are considered likely to be similar in nature to construction phase effects and will be managed by a Decommissioning Environmental Management Plan, as a likely Requirement of the DCO. As a result, it is considered unlikely that there would be significant cumulative effects.

Ref 78 (Runcorn Carbon Dioxide Spur Pipeline)

Construction

9.12.19 There is no application documents for this development. However, it is expected to be constructed in a similar manner to the hydrogen pipeline set out above. It is likely that CWACC would include a condition for a Construction Environmental Management Plan (CEMP) should the development be approved. Implementation of the CEMPs on the respective projects means it is unlikely that significant cumulative effects would arise should then be constructed in the same time period.

Operation

9.12.20 Once operational there are unlikely to be any impacts on flooding or surface water quality due to the pipeline being buried through the Site. As such it is therefore unlikely that there would be significant cumulative effects.

Decommissioning

9.12.21 Any effects associated with decommissioning works are considered likely to be similar in nature to construction phase effects and will be managed by a Decommissioning Environmental Management Plan. As a result, it is considered unlikely that there would be significant cumulative effects.

9.13 Conclusions

9.13.1 This Flood Risk, Drainage and Surface Water Chapter has considered the potential impacts that may arise at sensitive receptors during the construction, operational and decommissioning phases of the Proposed Development.

9.13.2 A baseline assessment of the receptors which have the potential to be affected by the construction, operation and decommission of the Project has been undertaken. An assessment of the likely significant effects has also been undertaken.

9.13.3 When accounting for proposed mitigation, the adverse effects are predicted to be **not significant** with respect to Flood Risk, Drainage and Surface Water. No residual significant effects have been identified.

9.14 References

[i] Department for Energy Security and Net Zero (2024). *Overarching National Policy Statement for energy (EN-1).* Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1 [Last Accessed: 20 April 2025]

[ii] Department for Energy Security and Net Zero (2024). *National Policy Statement for renewable energy infrastructure (EN-3).* Available at: https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3 [Last Accessed: 20 April 2025]

[iii] Department for Energy Security and Net Zero (2024). *National Policy Statement for electricity networks infrastructure (EN-5).* Available at: https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5 [Last Accessed: 20 April 2025]

[iv] Ministry of Housing, Communities and Local Government(2025). *National Planning Policy Framework (NPPF).* Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Last Accessed: 20 April 2025]

[v] Ministry of Housing, Communities and Local Government (2024). *Planning practice guidance (PPG).* Available at: https://www.gov.uk/government/collections/planning-practice-guidance [Last Accessed: 20 April 2025]

[vi] Available at: https://www.gov.uk/check-long-term-flood-risk [Last Accessed: 20 April 2025]

[vii] Defra Survey Data Download. Available at: https://environment.data.gov.uk/survey [Last Accessed: 20 April 2025]

[viii] Cheshire West and Chester Level 1 Strategic Flood Risk Assessment (March 2016) Available at: https://www.cheshirewestandchester.gov.uk/documents/parking-roads-and-travel/highways/flood-risk-assessment-final-report.pdf [Last Accessed: 20 April 2025]

[ix] Draft Cheshire West and Chester Council Preliminary Flood Risk Assessment (2017-2023) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698398/PFRA_Cheshire_West_and_Chester_Council_2017.pdf [Last Accessed: 20 April 2025]

[x] ReFH2 Flood Estimated Handbook Web Service. Available at: https://fehweb.ceh.ac.uk/ [Last Accessed: 20 April 2025]

[xi] Planning Inspectorate. Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive. https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-the-water-framework-directive [Last Accessed: 20 April 2025]

[xii] Environment Agency Catchment Data Explorer. Available at: https://environment.data.gov.uk/catchment-planning [Last Accessed: 20 April 2025]