Keuper Gas Storage Project

Scoping Report

PREPARED FOR
KGSL

DATE
April 2025

REFERENCE
EN030002

DOCUMENT DETAILS

DOCUMENT TITLE	**Keuper Gas Storage Project**
DOCUMENT SUBTITLE	Scoping Report
PROJECT NUMBER	EN030002
DATE	April 2025
VERSION	1.0
AUTHOR	[redacted]
CLIENT NAME	Keuper Gas Storage Limited

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
01	Draft	[redacted]	[redacted]	[redacted]	07/03/2025	DRAFT
1.0	Final Draft	[redacted]	[redacted]	[redacted]	15/04/2025	FINAL

SIGNATURE PAGE

Keuper Gas Storage Project

Scoping Report

EN030002

[redacted]

[redacted]

Senior Consultant

Managing Consultant

[redacted]

[redacted]

Technical Consulting Director

Partner

Environmental Resources
Management Limited
2nd Floor, Exchequer Court
33 St Mary Axe
London
EC3A 8AA

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS and ABBREVIATIONS

Acronym	Description
µg/m3	Microgram per metre cubed
ALARP	As Low As Reasonably Practicable
ALC	Agricultural land classification
APS	Annual Population Survey
AQIA	Air Quality Impact Assessment
AQMA	Air Quality Management Area
AQS	Air Quality Standards
ASCV	Areas of Special County Value
BAT	Best Available Techniques
BGS	British Geological Survey
BMV	Best and most versatile
BRES	Business Register and Employment Survey
BS 4142	BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound
BS 5228-1	BS 5228-1:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1. Noise
BS 5228-2	BS 5228-2:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2. Vibration
BS 8233	BS 8233:2014 Guidance on sound insulation and noise reduction for buildings
CA	Competent Authority
CAPA	Cheshire Archaeology Planning Advisory Service
CDM	Construction (Design and Management)
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CiFA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CL	Critical Level or Critical Load

Acronym	Description
CMLI	Chartered Member of the Landscape Institute
CO2	Carbon dioxide
CO2e	CO2 equivalent
COMAH	Control Of Major Accident Hazards
CoPA	Control of Pollution Act 1974
CTMP	Construction Traffic Management Plan
CWAC	Cheshire West and Chester Council
dB	decibel
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DMP	Drainage Management Plan
DMRB	Design Manual for Roads and Bridges
DoW: CoP	Definition of Watse: Code of Practice
EA	Environment Agency
EAL	Environmental Assessment Level
EC	European Commission
EcIA	Ecological Impact Assessment
EGF	Enclosed Ground Flare
EIA	Environmental Impact Assessment
EIA0	Environmental Impact Assessment
EMS	Environmental Management System
EPA	Environmental Protection Act 1990
EPC	Engineering Procurement Contractor
ERM	Environmental Resources Management Ltd.
ES	Environmental Statement
ESA	Environmental Site Assessment
EU	European Union

Acronym	Description
FEED	Front End Engineering Design
FRA	Flood Risk Assessment
GCN	Great crested newt
GHG	Greenhouse Gas
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GMC	Gas Marshalling Compounds
GPP	Gas Processing Plant
GVA	Gross Value Added
ha	hectares
HAGI	Hydrogen Above Ground Infrastructure
HAZAN	Hazard Analysis
HAZID	Hazard Identification
HAZOP	Hazard and Operability Analysis
HBC	Halton Borough Council
HGV	Heavy Goods Vehicle
HSA	Hazardous Substances Authority
HSC	Hazardous Substances Consent
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
HSWA	Health and Safety at Work Act
HV	High Voltage
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
IMD	Indices of Multiple Deprivation
ISO 9613	ISO 9613-2:2024 Acoustics. Attenuation of sound during propagation outdoors - Engineering method for the prediction of sound pressure levels outdoors
KGSL	Keuper Gas Storage Limited
KGSP	Keuper Gas Storage Project

Acronym	Description
Km	kilometre
LA90	background sound level
LAeq,T	continuous equivalent sound level
LAQM	Local Air Quality Management
LAr,Tr	rating level
LCA	Landscape Character Area
LCRM	Land Contamination Risk Management
LCT	Landscape Character Type
LDV	Light Duty Vehicle
LLFA	Lead Local Flood Authority
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LSWB	Lesser Silver Water Beetle
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
M	Metre
m/s	Metres per second
m3	Metre cubed
MA&D	Major Accidents and Disasters
MAH	Major Accident Hazards
MC	Material Change
MCM	Million Cubic Metres
MDS	Maximum Design Scenario
NCA	National Character Area
NMC	Non-Material Change
NO2	Nitrogen Dioxide
NOAEL	No Observed Adverse Effect Level
NOx	Oxides of Nitrogen

Acronym	Description
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPS EN-1	Overarching National Policy Statement for Energy
NPS EN-4	National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines
NPS EN-5	National Policy Statement for Electricity Networks Infrastructure
NPSE	Noise Policy statement for England 2010
NSIP	Nationally Significant Infrastructure Project
NSR(s)	Noise Sensitive Receptor(s)
NTS	National Transmission System
ONS	Office for National Statistics
PEIR	Preliminary Environmental Information Report
PM	Particulate Matter
PM10	Particulate Matter of aerodynamic diameter <10µm
PM2.5	Particulate Matter of aerodynamic diameter <2.5µm
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPGN	Planning Practice guidance – Noise (2019)
PPP	Pollution Prevention Plan
PPV	peak particle velocity
PRoW	Public Right of Way
PSVs	Pressure Safety Valves
RBMP	River Basin Management Plan
RIGGS	Regionally Important Geological or Geomorphological Site
SAC	Special Area of Conservation
SECP	Sediment Erosion and Control Plan
SMC	Solution Mining Compound
SMP	Soil Management Plan
SOAEL	Significant Observed Adverse Effect Level

Acronym	Description
SoC	Standard Occupational Classification
SPA	Special Protected Area
SPD	Supplementary Planning Documents
SPEN	ScottishPower Energy Networks
SPZ	Source Protection Zone
SRAM	Safety Report Assessment Manual
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWDS	Surface Water Drainage Strategy
t	tonnes
UHS	Underground Hydrogen Storage
UK	United Kingdom
UOAEL	Unacceptable Observed Adverse Effect Level
VP	Viewpoint
WFD	Water Framework Directive
WMP	Waste Management Plan
WRAP	Waste and Resource Action Programme
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

1. INTRODUCTION

1.1 PURPOSE OF THIS REPORT

1.1.1.1 Keuper Gas Storage Limited (KGSL) (hereafter referred to as 'the Applicant') is proposing a Material Change (MC) to the Keuper Gas Storage Project (KGSP) to construct and operate an underground hydrogen storage facility known as the Keuper Gas Storage Project on and under land in the Holford Brinefield, Middlewich in the County of Cheshire (hereafter referred to as 'the Proposed Development').

1.1.1.2 This Scoping Report has been prepared by Environmental Resources Management Ltd (ERM) on behalf of the Applicant to support a request for a Scoping Opinion from the Secretary of State. The request for a Scoping Opinion is to inform a Preliminary Environmental Information Report (PEIR) and an updated Environmental Statement (ES) to accompany a MC application for proposed changes to the scheme consented under the Keuper Underground Gas Storage Facility Order 2017 (Statutory Instrument 2017 No. 433), and the Keuper Underground Gas Storage Facility (Amendment) Order 2024 (Statutory Instrument 2024 No. 674), all referred to as 'the Consented Development'.

1.2 PROJECT HISTORY

1.2.1.1 The Keuper Underground Gas Storage Facility Order 2017 was made on 15 March 2017 and came into force on 5 April 2017. The original Nationally Significant Infrastructure Project (NSIP) proposed to build an underground natural gas storage facility consisting of 19 salt caverns and associated gas treatment and transfer facilities for connection to the national gas transmission network.

1.2.1.2 The DCO was submitted to the Secretary of State for Business, Energy and Industrial Strategy (BEIS, now DESNZ – Department for Energy Security and Net Zero) in December 2015 and was granted in March 2017. A Correction Order was made later in 2017 to correct minor errors.

1.2.1.3 Following the Order being made, the need for hydrogen gas storage within the UK to support the storage of excess renewable electricity ('British Energy Security Strategy', UK Government, 7 April 2022) has grown. In support of the UK's efforts to decarbonise and achieve net zero emissions by 2050, KGSL have been working towards the conversion of the consented DCO to allow for large-scale underground hydrogen storage (UHS). This will support regional and national ambitions for decarbonisation by providing essential low carbon energy storage capacity. In particular, the storage of hydrogen at the site will form a critical element of the HyNet consortium for hydrogen generation and supply in the north-west and Wales.

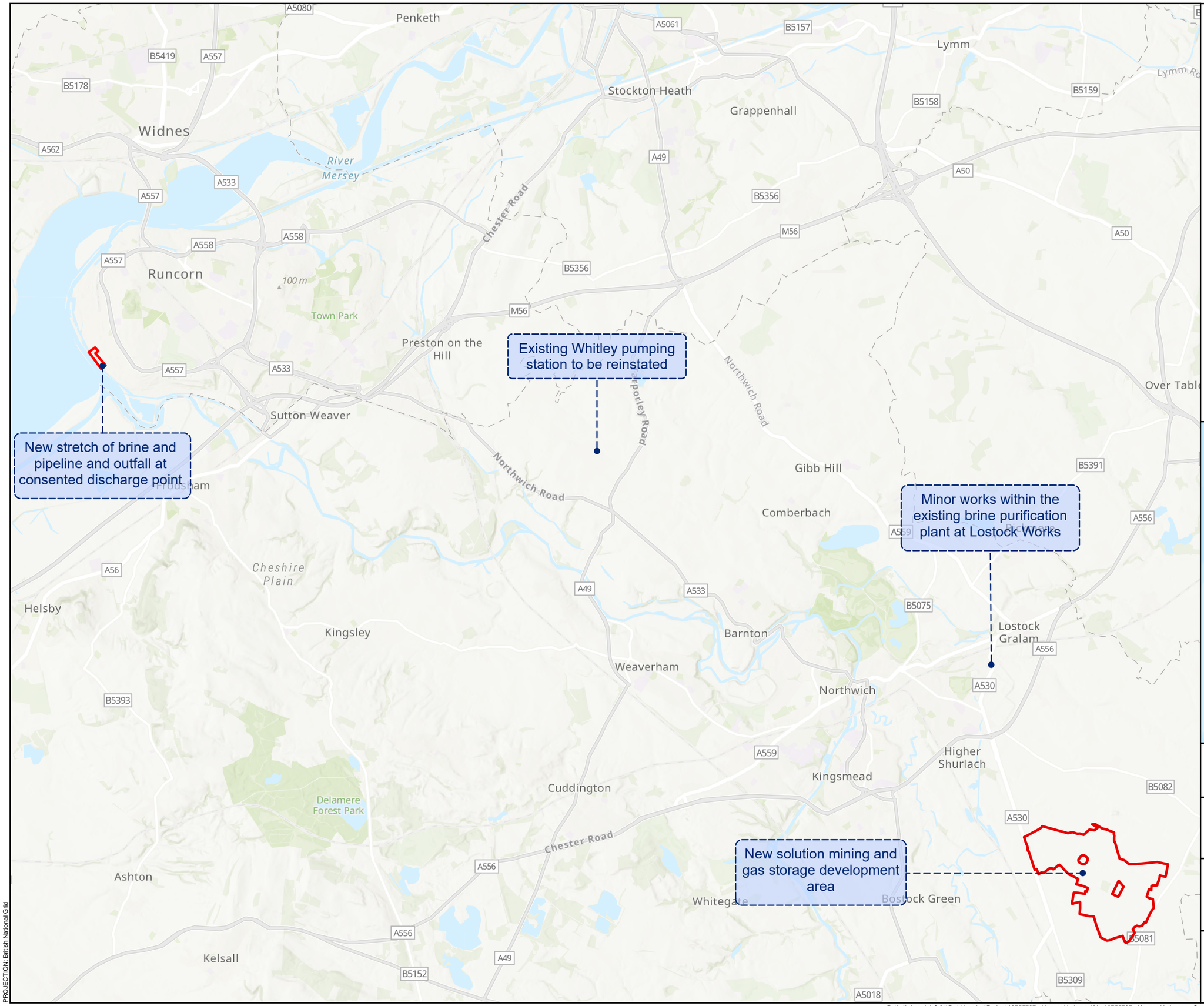
1.2.1.4 A Non-Material Change (NMC) application to the consented DCO was submitted to the Planning Inspectorate and Secretary of State in November 2022. The NMC sought to amend the consented DCO to enable the storage of hydrogen gas, alongside an alternative gas connection compound and amendment to the siting and layout of an office building. A decision on the NMC application was provided by the Secretary of State in May 2024, but was not successful for the hydrogen related amendments proposed. Other minor amendments were granted, and an Amendment Order was made by Government in May 2024 (S.I.2024/674).

1.2.1.5 The DCO as it stands following the original consent order and the amendment order will be referred to as 'the Consented Development' throughout this report from this point onwards.

1.2.1.6 The Secretary of State for Energy Security and Net Zero confirmed in a letter on 15 May 2024 that they did not consider the changes relating to hydrogen to be non-material and cannot therefore be dealt with under the procedure for non-material changes. Following discussions with the Applicant and a meeting with the Planning Inspectorate in January 2025, it was determined that the consenting route for the Proposed Development would be a MC to the Consented Development.

1.3 PROPOSED DEVELOPMENT LOCATION

1.3.1.1 The Proposed Development is located within the Holford Brinefield, in Cheshire, about 3 km west of the M6 and approximately 3 km north of Junction 18 which is shown below on **Figure 1.1**. The Proposed Development is bounded to the west by the A530 (King Street) and to the east by the B5081. The nearest village is Byley, 2.5 km to the east. The Proposed Development and all the proposed amendments are still contained within the Consented Development red line boundary (as shown on **Figure 1.1**). There are no changes at the three satellite sites; Lostock Works, Whitely Pumping Station and Runcorn from the Consented Development shown on **Figure 1.1** and therefore not considered further within this report.



SCALE: See Scale Bar | VERSION: A01
SIZE: A3 | DRAWN: MC
PROJECT: 0755727 | CHECKED: DR
DATE: 25/04/2025 | APPROVED: DR

Figure 1.1
DCO Application Boundary
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - DCO Application Boundary - A01

1.4 PROPOSED DEVELOPMENT TECHNICAL CAPACITY

1.4.1.1 The technical capacity of the Proposed Development is very similar to that of the Consented Development, with the main change being the storage of hydrogen rather than natural gas.

1.4.1.2 The gas storage facility will be designed to store a working gas volume of approximately 400 standard million cubic metres (mcm) of hydrogen, with an import and export capability of up to 45 mcm per day. This is a change to the Consented Development, which is designed to store a working gas volume of approximately 500 mcm of natural gas, with an import and export capability of up to 34 mcm per day. The main reason for the difference in storage capability is due to the different fluid properties of hydrogen compared to natural gas, most notably its lower density. There are no changes required to the salt caverns in terms of:

- Number
- Location
- Size
- Cavern development methodology (proven technique of solution mining)
- Wellhead compounds

1.4.1.3 The other key changes to the consented development are described below in **Section 1.5**.

1.5 KEY PROPOSED CHANGES TO THE CONSENTED DEVELOPMENT

1.5.1.1 The changes to the key components for the Proposed Development are:

- proposed storage of hydrogen gas rather than natural gas;
- changes to the Gas Processing Plant (GPP) area and hydrogen compatible equipment including amendments to the locations of utility package plants (nitrogen and air) and the electrical substation, as well as amendments to the venting / flaring technology. Engineering and process safety studies are underway to determine the most suitable arrangement;
- the proposed National Transmission System (NTS) compound for natural gas is being replaced by the Hydrogen Above Ground Infrastructure (HAGI) for connection to the HyNet hydrogen transmission system (secured through Cadent's HyNet Hydrogen Pipeline DCO Application) which requires an amendment to the location and sizing of the network connection compound; and
- changes to elements of the Solution Mining Compound (named 'SMC3' in the Consented Development).

1.5.1.2 Full details of the proposed changes are discussed in **Chapter 2, Proposed Development Description**.

1.6 REQUEST FOR SCOPING OPINION

1.6.1.1 To initiate the MC process, ERM on behalf of the Applicant, has prepared this Environmental Impact Assessment (EIA) Scoping Report ('the Scoping Report'), which presents an initial consideration of the likely significant effects associated with the construction, operation, maintenance, and eventual decommissioning of the Proposed Development.

1.6.1.2 This Scoping Report supports a request for a formal EIA Scoping Opinion from the Secretary of State in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the '2017 EIA Regulations') and to ensure a proportionate EIA.

1.6.1.3 The Scoping Opinion is expected to contain a variety of responses to the scoping report from statutory and other key stakeholders, which will guide the Applicant in progressing an EIA for the Proposed Development. The Applicant requests that the Secretary of State sets out in writing their opinion of the scope of work, and level of detail of information to be provided in the PEIR and ES.

1.6.1.4 This Scoping Report includes the following information:

- a description of the Proposed Development, including its location and technical capacity;
- an explanation of the likely significant effects of the development;
- such other information the Applicant considers material; and
- a plan sufficient to identify the land.

1.6.1.5 The Applicant hereby gives notice, pursuant to Regulation 8(2)(b) of the 2017 EIA Regulations, that the MC application will be accompanied by a PEIR and ES. The PEIR and ES will include the information set out in Regulation 14(a) – (e) and any additional information specified in Schedule 4 of the 2017 EIA Regulations relevant to the specific characteristics of the Proposed Development; and to the environmental features likely to be significantly affected. It will include the information reasonably required for reaching a reasoned conclusion on the likely significant effects of the Proposed Development.

1.7 THE APPLICANT

1.7.1.1 The Applicant for the Material Change to the Consented Development is KGSL.

1.8 EIA TEAM

1.8.1.1 The preparation of the PEIR and ES is being led by ERM, who will provide local technical knowledge and resources across the environmental studies associated with the Proposed Development. Pursuant to Regulation 14(4) of the 2017 EIA Regulations, the PEIR and ES will be prepared by competent experts, and the PEIR and ES

will outline the relevant expertise or qualifications of the experts. The PEIR and ES will also contain inputs from other technical consultancies where required: Peak Ecology Limited, Land Use Consultants Limited and Nathaniel Lichfield and Partners Limited (Lichfields).

1.9 REPORT CONTENT AND STRUCTURE

1.9.1.1 The remainder of the Scoping Report includes the following:

- **Chapter 2, Proposed Development Description -** an overview of the Proposed Development;
- **Chapter 3, Planning and Policy Context -** an outline of relevant policy, standards, and guidance;
- **Chapter 4, Alternatives -** outlines the options considered for the Proposed Development;
- **Chapter 5, Methodology -** describes the overall approach to the EIA;
- **Chapter 6, Likely Significant Effects and Proposed Scope of the PEIR and ES -** outlines the potential effects of the terrestrial elements of the Proposed Development (the hydrogen storage facility and brine and solution mining infrastructure).
- **Chapter 7, Mitigation and Commitments Register Approach –** which sets out the approach to mitigation and commitments set out in the Consented Development; and
- **Chapter 8, Cumulative Effects Assessment (CEA) –** outlines the approach and methodology to be used to assess cumulative effects in the PEIR and ES including the Planning Inspectorate Advice Note 17 Guidance with the stage breakdown i.e., Stage 1 (longlist of CEA Developments), Stage 2 (shortlist of CEA Developments), Stage 3 (information gathering) and Stage 4 (assessment).
- **Technical Appendices –** details the baseline, basis of assessment, scoping and technical methodologies for topic chapters. This includes:
  - Geology and Ground Conditions;
  - Hydrology and Flood Risk;
  - Air Quality;
  - Noise and Vibration;
  - Traffic and Transport;
  - Ecology and Nature Conservation;
  - Landscape and Visual Impact Assessment;
  - Cultural Heritage;
  - Socio-Economic Characteristics;
  - Population and Human Health;
  - Major Accidents and Disasters;
  - Waste; and
  - Climate Change and Greenhouse Gas Emissions.

2. PROPOSED DEVELOPMENT DESCRIPTION

2.1 INTRODUCTION

2.1.1.1 This chapter provides a summary of the Proposed Development and its changes to the 2017 Consented DCO and the consented amendments in the NMC (hereafter referred in the whole as the "Consented Development"). It also describes the changes to the consented activities to be undertaken during the construction, operation and maintenance and decommissioning phases, including the Proposed Development phasing, parameters and indicative timescales.

2.2 RATIONALE FOR A MATERIAL CHANGE

2.2.1.1 The proposed changes have been reviewed against Advice Note 16: 'How to request a change which may be material', it states: "there is no legal definition of 'material' but the tests to apply are whether the change is substantial or whether the development now being proposed is not in substance that which was originally applied for…. Whether a proposed change falls within either of these categories is a question of planning judgment which may be based on criteria including, for example, whether the change would generate a new or different likely significant environmental effect(s). Similarly, whether (and if so the extent to which) a change request involves an extension to the Order land, particularly where this would require additional Compulsory Acquisition powers e.g. for new plots of land and/ or interests".

2.2.1.2 Considering the above, the Applicant intends to make material amendments to the Consented Development design which are described in Section 2.5 below. Although, there are no changes to the boundary of the Consented Development and no additional compulsory acquisition powers required for the Proposed Development, there are key changes to the site infrastructure which need to be assessed in further detail in the PEIR and ES. For the purposes of this Scoping report, the likely significant effects have been estimated in each of the technical appendices for each environmental topic and are summarised in **Chapter 6, Likely Significant Effects and Proposed Scope of the PEIR and ES**.

2.2.1.3 Within the Secretary of State's response to the Non-Material Change application (dated 15th May 2024) it is stated that the changes relating to hydrogen are **not** non-material changes and cannot therefore be dealt with under the procedure for non-material changes. Therefore, the changes relating to hydrogen will be addressed within this MC application. The Secretary of State, however, was satisfied that the proposed changes not relating to hydrogen were unlikely to result in any further environmental impacts and would have remained within the parameters of the ES that accompanied the Consented Development.

2.2.1.4 With regard to the issues specifically in relation to hydrogen, the Secretary of State requested further information on safety, permeability and leakage, minimising the risk of accidents or loss of containment. To respond to these questions, a Major Accidents and Disasters Assessment (included within **Technical Appendix K** of this scoping report) and related safety studies will be included with the MC application documentation. The majority of the changes to the proposed PEIR and ES are required due to the updates in guidance and policy to ensure that the PEIR and ES are fit for purpose and follows current guidelines and assessment methodology, rather than as a result of the identification of new or different likely significant effects from the proposed MC. Key updates have been identified within **Chapter 6, Likely Significant Effects and Proposed Scope of the PEIR and ES.**

2.2.1.5 The remainder of this chapter presents in more detail the proposed changes that are to be included within the MC application.

2.3 DESIGN ENVELOPE APPROACH

2.3.1.1 The Design Envelope approach is widely recognised and is consistent with the Planning Inspectorate Advice Note Nine: Rochdale Envelope (July 2018 (version 3)) which states that: "The 'Rochdale Envelope' is employed where the nature of the Proposed Development means that some details of the whole design have not been confirmed (for instance the precise dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty".

2.3.1.2 At this stage, the Proposed Development design is still indicative, and the 'envelope' has been flexibly designed to allow further optioneering as the EIA progresses. The Design Envelope approach has been (and will continue to be) taken to allow meaningful assessments of the Proposed Development to proceed, whilst still allowing reasonable flexibility for future design decisions in this Scoping Report, the subsequent EIA and as the Proposed Development is brought forward.

2.3.1.3 This Proposed Development Description sets out the parameters and maximum values to be used to constitute a realistic Maximum Design Scenario (MDS) for the Proposed Development for the purposes of obtaining a scoping opinion. For topic scoping, where elements of the design are still being considered, topics will assess a reasonable worst-case scenario as relevant to that topic.

2.3.1.4 The MDS will be refined through design, consultation, and EIA processes.

2.4 THE SCOPING BOUNDARY

2.4.1.1 **Figure 2.1** shows the 'Scoping Boundary' that has been used to inform this Scoping Report. **Figure 2.2** shows a comparison of the Consented Development layout and the draft site layout for the

Proposed Development which identifies where the components discussed below are located within the Scoping Boundary.

2.4.1.2 The Scoping Boundary is defined as the area within which the Proposed Development will be physically located, including the temporary work areas.

2.4.1.3 The Scoping Boundary includes flexibility for decisions yet to be made on aspects of siting and currently reflect the same area as the Consented Development (i.e. the Consented DCO Order limits).

N

0 150 300 450 600 750m

SCALE 1:7500

TITLE

FIGURE 2.1 - HOLFORD BRINEFIELD - KGSP - GENERAL ARRANGEMENT SHOWING MAIN SITE DCO ORDER LIMITS

REV	ALTERATIONS	CHKD BY	DATE
P1	ISSUED FOR INFORMATION	CR	03/04/25

KEUPER GAS STORAGE LIMITED

BRINE AND WATER SECTION, NORTHWICH SITES,
HOLFORD BRINEFIELD, LOSTOCK GRALAM,
NORTHWICH, CHESHIRE, CW9 7TD.

WARNING

THIS DRAWING HAS BEEN GENERATED USING C.A.D AUTHORISED COPYING AND MICROFILMING IS PERMITTED BUT UNDER NO CIRCUMSTANCES SHOULD REVISIONS BE MADE TO THE DRAWING EXCEPT BY UPDATING THE C.A.D MASTER IMAGE.

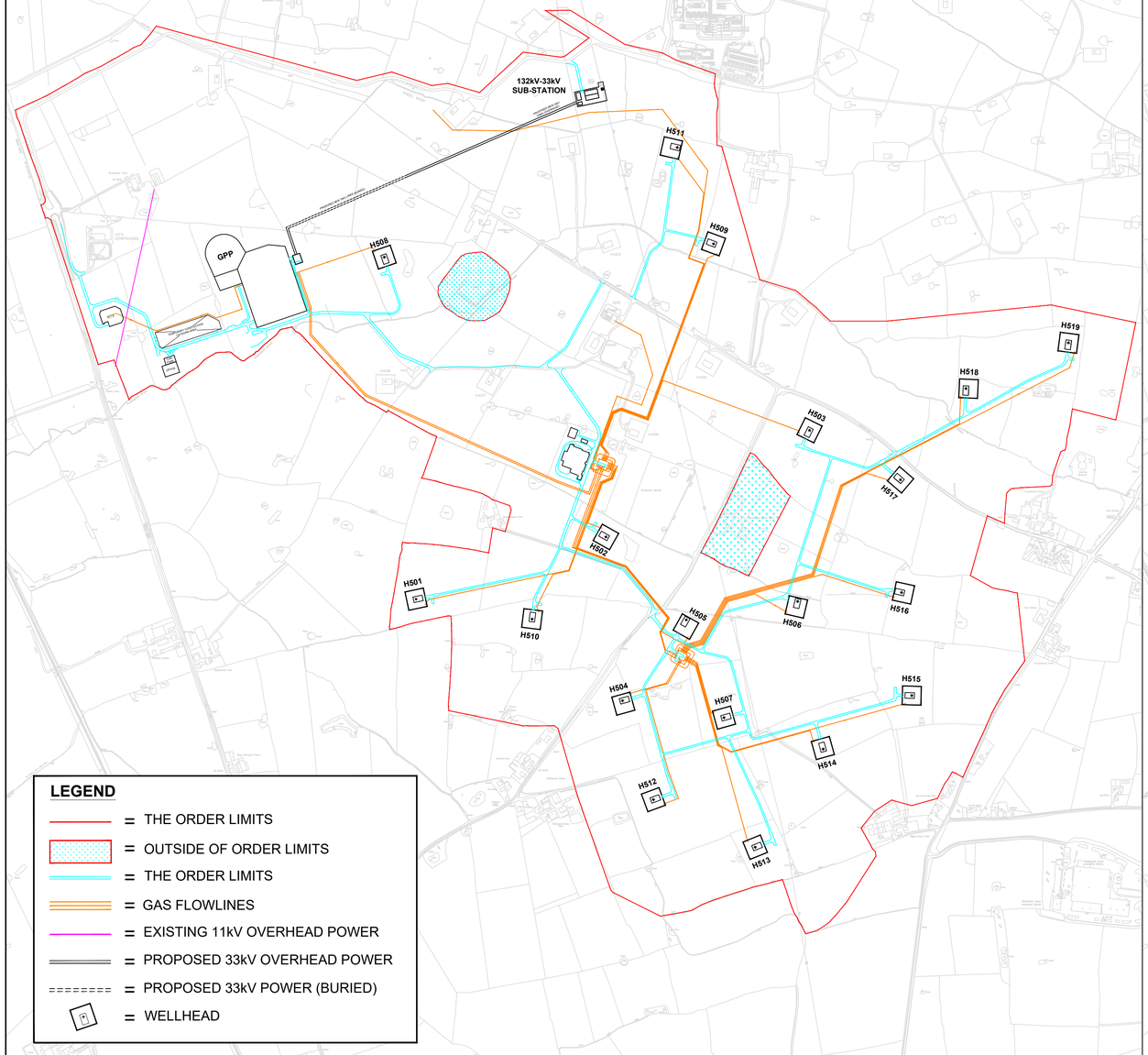
IF ANY DOUBT EXISTS PLEASE CONTACT HOLFORD DRAWING OFFICE FOR CONFIRMATION OF CURRENT DRAWING STATUS

DRAWN BY	[redacted]	DATE	03/04/25
CHECKED BY	[redacted]	DATE	03/04/25
TEL:			
EXT:			

APPROVED BY		
C	M	
INST	E	

ACC. No.		PROJECT No.	SCALE 1:7500
WORKS	PLANT REF.	APPLICATION No. EN030002	SIZE A1
GEOG. AREA (S)		DRAWING No. KEU-HYK1G-DRG-01-0040	REV P1

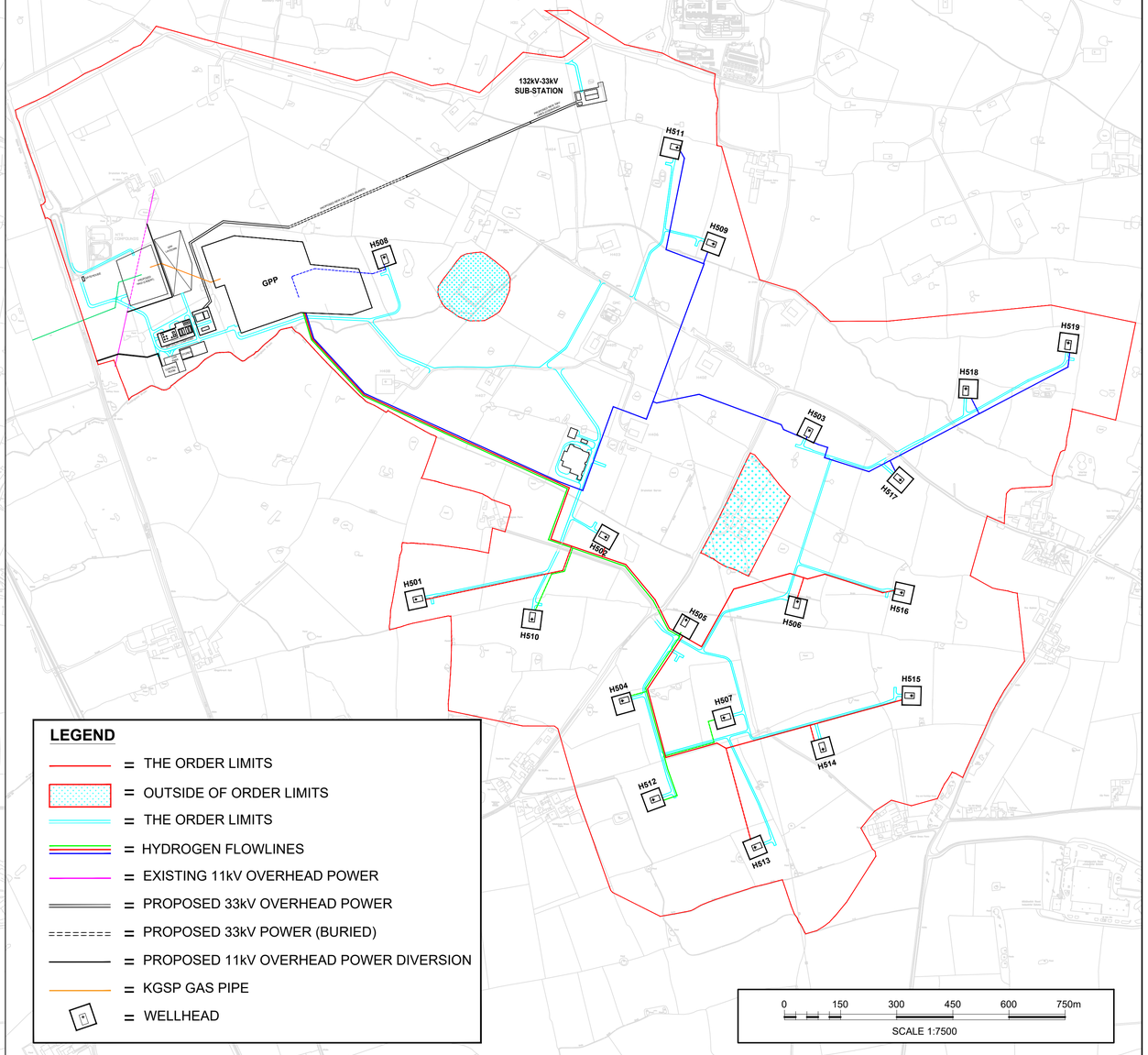
DCO CONSENTED ARRANGEMENT



LEGEND

- = THE ORDER LIMITS
- = OUTSIDE OF ORDER LIMITS
- = THE ORDER LIMITS
- = GAS FLOWLINES
- = EXISTING 11kV OVERHEAD POWER
- = PROPOSED 33kV OVERHEAD POWER
- = PROPOSED 33kV POWER (BURIED)
- = WELLHEAD

MATERIAL CHANGE INDICATIVE ARRANGEMENT



LEGEND

- = THE ORDER LIMITS
- = OUTSIDE OF ORDER LIMITS
- = THE ORDER LIMITS
- = HYDROGEN FLOWLINES
- = EXISTING 11kV OVERHEAD POWER
- = PROPOSED 33kV OVERHEAD POWER
- = PROPOSED 33kV POWER (BURIED)
- = PROPOSED 11kV OVERHEAD POWER DIVERSION
- = KGSP GAS PIPE
- = WELLHEAD

0 150 300 450 600 750m

SCALE 1:7500

TITLE

FIGURE 2.2 - HOLFORD BRINEFIELD - KGSP - GENERAL ARRANGEMENT SHOWING MAIN SITE - CONSENTED DCO ARRANGEMENT VS MATERIAL CHANGE INDICATIVE ARRANGEMENT

REV	ALTERATIONS	CHKD BY	DATE
P2	ISSUED FOR INFORMATION	CR	10/04/25
P1	FOR PLANNING WORKSHOP	CR	10/11/24

KEUPER GAS STORAGE LIMITED

BRINE AND WATER SECTION, NORTHWICH SITES,
HOLFORD BRINEFIELD, LOSTOCK GRALAM,
NORTHWICH, CHESHIRE, CW9 7TD.

WARNING

THIS DRAWING HAS BEEN GENERATED USING C.A.D AUTHORISED COPYING AND MICROFILMING IS PERMITTED BUT UNDER NO CIRCUMSTANCES SHOULD REVISIONS BE MADE TO THE DRAWING EXCEPT BY UPDATING THE C.A.D MASTER IMAGE.

IF ANY DOUBT EXISTS PLEASE CONTACT HOLFORD DRAWING OFFICE FOR CONFIRMATION OF CURRENT DRAWING STATUS

DRAWN BY	[redacted]	DATE	10/04/25
CHECKED BY	[redacted]	DATE	10/04/25
TEL:			
EXT:			

APPROVED BY		ACC. No.	PROJECT No.	SCALE
C	M			1:7500
INST	E			

WORKS	PLANT REF.	APPLICATION No.	SIZE
		EN030002	A1
GEOG. AREA (S)		DRAWING No. KEU-HYK1G-DRG-01-0028	REV P2

2.5 PROPOSED CHANGES

2.5.1.1 This section of the report summarises the proposed changes in relation to the Consented Development and the accompanying figures.

2.5.2 CHANGES TO THE PERMANENT WORKS

2.5.2.1 The KGSP is now being designed for hydrogen storage and whilst the majority of the proposed infrastructure is the same as the Consented Development, a number of design changes are required to support this amendment. All of these changes fall within the boundary of the Consented Development with no additional land required for the proposed changes.

2.5.2.2 Since the Consented Development and the NMC, KGSL has undertaken further studies. These include sub-surface work and process safety design work, as well as making minor design enhancements within the limits of the Consented Development. Furthermore, technologies, design standards and policy have progressed since the Consented Development. Therefore, in addition to the changes to support the change to hydrogen storage, the MC also incorporates minor design developments allowing optimisation of the original plant and layout.

2.5.2.3 In addition to the changes to be considered under the MC, there have been a number of minor amendments which fall within the limits of deviation of the Consented Development. Where amendments are made within the limits of deviation, these will be consented through Cheshire West and Chester Borough Council (CWAC) and therefore fall outside of the scope of this Scoping Report.

2.5.2.4 Given the nature of the Proposed Development, the majority of development activity will take place below ground. However, a degree of above-ground processing will be required to operate the Hydrogen Storage Facility. Although the exact configuration and layout are still to be confirmed, the layout of the Hydrogen Storage Facility is relatively advanced for the scoping stage of a project and will require the following changes:

Gas Processing Plant (GPP)

2.5.2.5 The Gas Processing Plant (GPP) will be located approximately 369886 East, 370226 North. Engineering and process safety studies are currently being refined to develop the most suitable GPP area arrangement for the Proposed Development.

2.5.2.6 The GPP itself will contain compressors, dehydration equipment, pigging facilities, vent and/or flare facilities, and fiscal metering. The wider GPP area contains the GPP, internal site roads, GPP utility compound (which will contain the nitrogen packing plant, compressed air package plant, 33 kV electrical substation), surface water facilities, and the pipeline connection to the Hydrogen Above Ground Installation

(HAGI), the control building and maintenance stores building. A summary of the modifications to the GPP are detailed in **Table 2.1**.

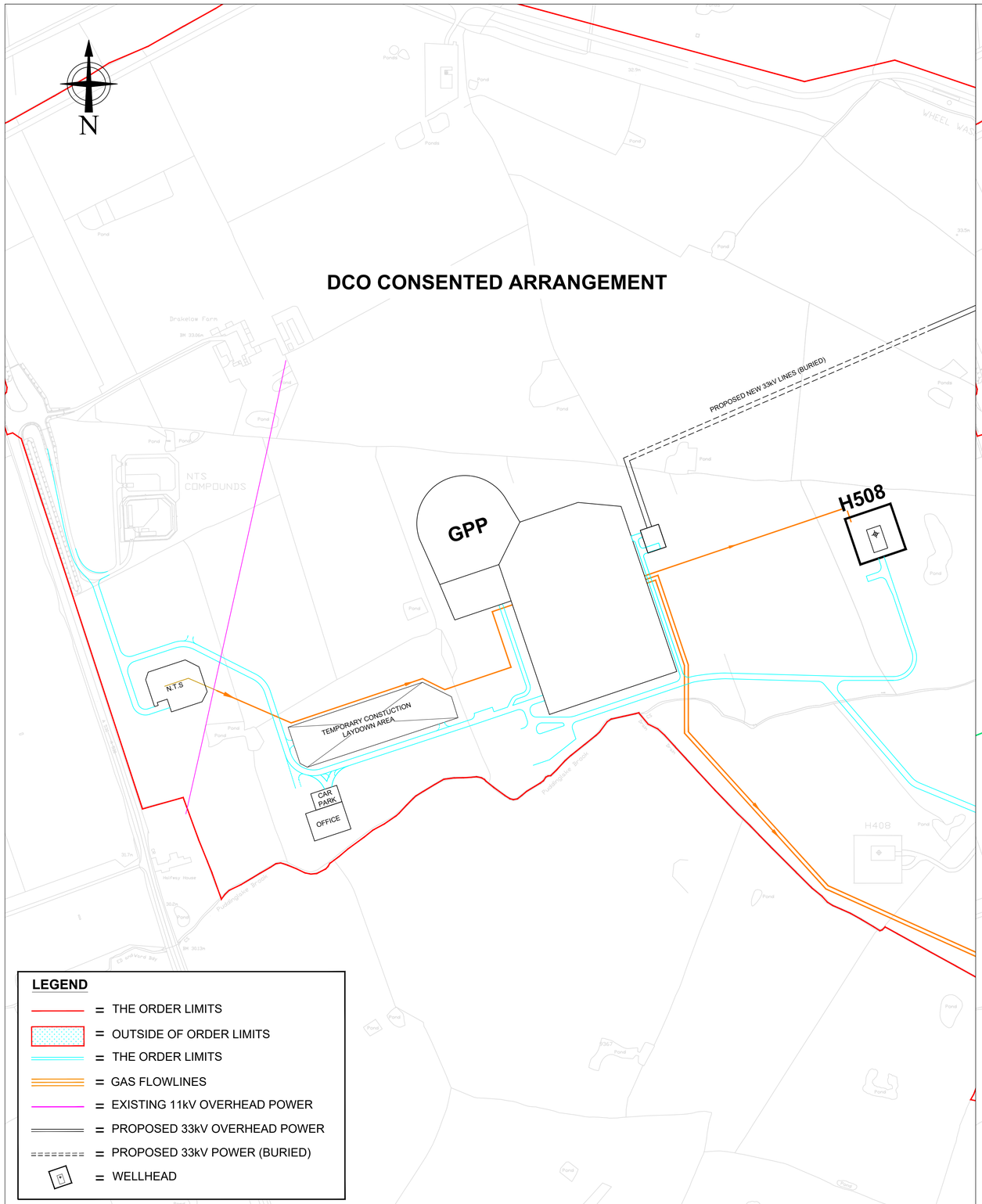
TABLE 2.1 - GPP AREA - EXTENT OF POSSIBLE MODIFICATIONS

Item	Consented Development	Possible MC Modification
GPP Plot Area	~3.8 ha ~352 ha site, GPP is 1% of total plot)	~4.5 – 8.5 ha (~352 ha site, GPP is 1.2% – 2.4% of total plot)
GPP Building / Equipment Elevations	Compressor buildings and dehydration columns at 10 m	Max height of buildings/structures to be 10-15 m
GPP Equipment	Liquid based dehydration technology, including 4 columns (4 m diameter and 10 m high)	Solid based dehydration technology, including 6 – 12 columns (4-5 m diameter and 10-15 m high)
Nitrogen Package Plant	Nitrogen package system on the GPP plot.	Moved off the GPP plot to a utility compound.
Compressed Air Package Plant	Not included for.	Proposal for a compressed air system located off the GPP plot on the utility compound.
Electrical Substation	33 kV substation located on the GPP plot.	33 kV substation moved off the GPP plot to a utility compound.
Venting / Flaring Technology	Emergency Cold Vent	Four options are available and are being assessed from an environmental and process safety perspective: • Emergency Cold Vent (as per Consented Development) • Elevated Flare • Enclosed Ground Flare • Multi-Point Ground Flare A single option will be taken forward to the PEIR and ES.
Venting / Flaring	Emergency Cold Vent Stack: • Diameter = 0.6 m	Emergency Cold Vent Stack OR Flare Stack: • Diameter = 1.5 – 2 m

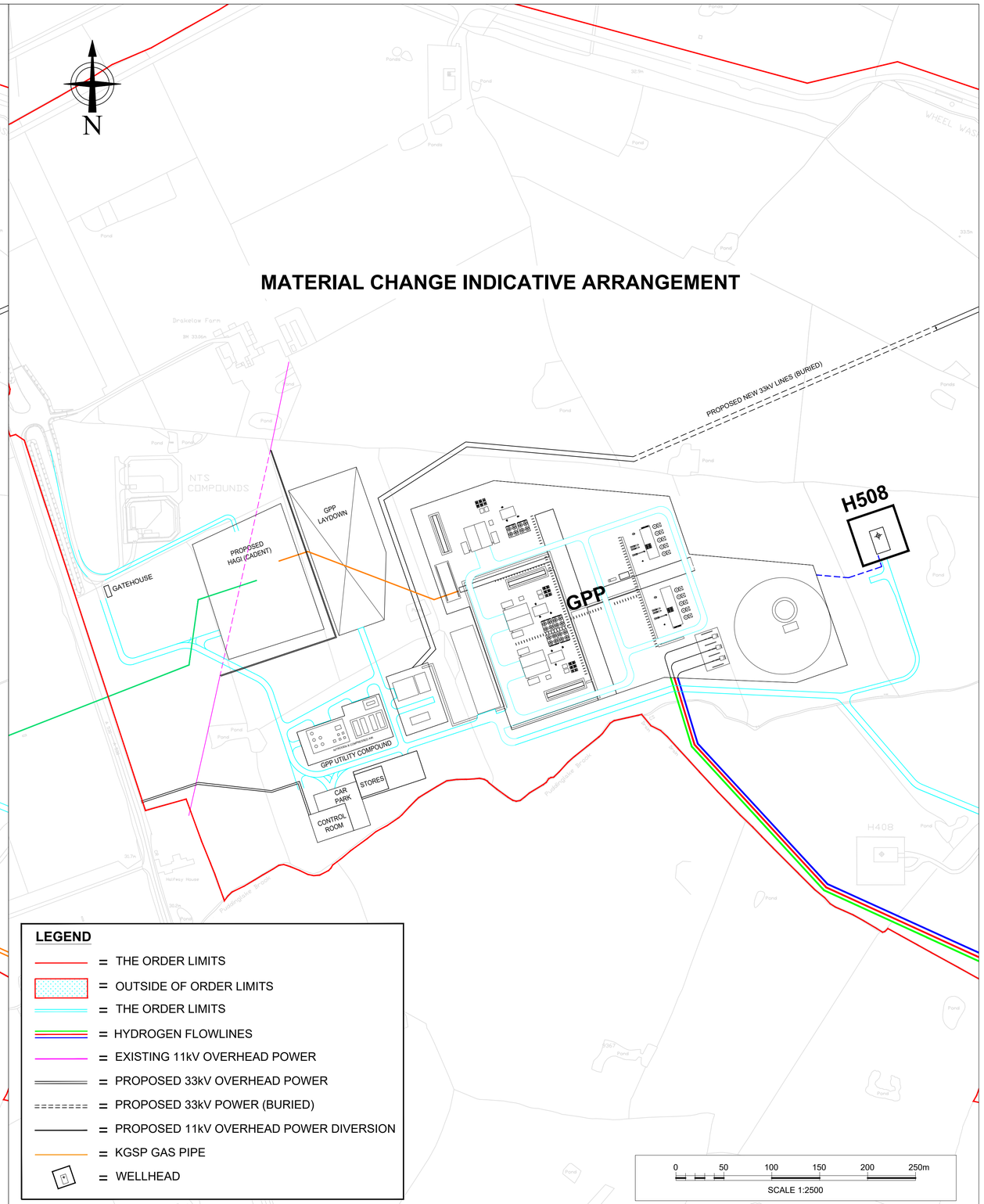
Item	Consented Development	Possible MC Modification
Elevation and Arrangement	• Height = 25 m	• Height = 25 – 50 m OR Enclosed Ground Flare: • Diameter = 15 – 30 m • Height = 15 – 30 m OR Multi-point Ground Flare: • Length/Width = 50 x 50 m • Height = 15 m

2.5.2.7 Due to the changes in GPP equipment and the further design work that has taken place since the Consented Development was granted, the GPP plot layout has been modified. The modified GPP plot layout and changes in GPP equipment are shown on below on **Figure 2.3**. Additional space on the GPP will improve constructability and allows for flexibility as the design matures with respect to process safety and the associated equipment separation distances. To achieve this the majority of the non-hydrogen infrastructure has been moved off- plot to a new utility compound to the west of the GPP and it is proposed to move the vent / flare stack to the east side of the GPP plot.

DCO CONSENTED ARRANGEMENT



MATERIAL CHANGE INDICATIVE ARRANGEMENT



TITLE

FIGURE 2.3 - HOLFORD BRINEFIELD - KGSP - GENERAL ARRANGEMENT SHOWING GPP AREA - DCO CONSENTED ARRANGEMENT VS MATERIAL CHANGE INDICATIVE ARRANGEMENT

REV	ALTERATIONS	CHKD BY	DATE
P2	ISSUED FOR INFORMATION	CR	10/04/25
P1	FOR PLANNING WORKSHOP	CR	18/10/24

KEUPER GAS STORAGE LIMITED

BRINE AND WATER SECTION, NORTHWICH SITES,
HOLFORD BRINEFIELD, LOSTOCK GRALAM,
NORTHWICH, CHESHIRE, CW9 7TD.

DRAWN BY	[redacted]	DATE 10/04/25
CHECKED BY	[redacted]	DATE 10/04/25
TEL:		
EXT:		

APPROVED BY	
C	M
INST	E

ACC. No.		PROJECT No.	SCALE 1:2500
WORKS	PLANT REF.	APPLICATION No. EN030002	SIZE A1
GEOG. AREA (S)		DRAWING No. KEU-HYK1G-DRG-01-0002	REV P2

Hydrogen Above Ground Infrastructure (HAGI)

2.5.2.8 To support the change from natural gas to hydrogen, the proposed National Transmission System (NTS) compound for natural gas is being replaced by the Hydrogen Above Ground Installation (HAGI) for connection to the HyNet hydrogen transmission system.

2.5.2.9 The NTS from the Consented Development will no longer be constructed, and instead the HAGI will be progressed by Cadent as part of a separate project. Due to the change from NTS to HAGI, there is an amendment to the location and sizing of the network connection with the HAGI likely to be 110 m x 90 m and located next to the Gas Processing Plant (GPP) to the west of the site. The HAGI compound has been described in this document for reference purposes only, and included in figures for clarity, consent of the compound will be sought in a separate DCO application for its project submitted by Cadent.

2.5.2.10 With the replacement of the NTS with the HAGI, the following changes are required and are to be assessed in the MC PEIR and ES:

- The GPP network connection pipework will change from operating with natural gas to operating with hydrogen. The pipework will be re-routed to allow for connection to the HAGI, opposed to the previously consented NTS location. The diameter and approximate length of the pipework remains consistent with the Consented Development; and,
- Diversion of an 11 kV electrical cable around the HAGI area.

Utility Compound

2.5.2.11 A utility compound consisting of the 33 kV Substation, 11 kV switchroom, Electrical and Instrumentation (E&I) building, nitrogen plant and compressed air plant will be located off the GPP plot to create additional space for design development and equipment separation that may be required following further hazardous consequence modelling and associated domino assessment. These elements are detailed further below.

Maintenance Stores Building

2.5.2.12 A storage warehouse designed to hold critical spare parts and equipment for maintenance and operation activities will be located off the GPP plot next to the consented Control Building.

Control Building Car Park

2.5.2.13 An extension to the consented control building car park is required.

Gatehouse

2.5.2.14 A small security gatehouse at the main site entrance (King Street) is required.

SMC3

2.5.2.15 The infrastructure at the consented compound, known as Solution Mining Compound 3 (SMC3) in the Consented Development, will be significantly reduced. The existing SMC at Stublach (off-site) will be used for solution mining of the KGSP caverns, with only limited utility and distribution functions required at the SMC3 compound. The existing SMC at Stublach will be considered in the MC PEIR and ES.

2.5.2.16 The footprint area of SMC3 will remain the same and will still contain the electrical compound and switch room, control equipment, nitrogen storage and distribution as described within the Consented Development. The key elements of SMC3 that will not be constructed under the Consented Development are the pumphouse, pumps, degassing tanks and the coolant system.

2.5.2.17 Provision of a new compressed air package located at SMC3 is required to provide low pressure air supply to instrumentation and control valves at each wellhead.

Wellhead Compounds

2.5.2.18 Each cavern has an associated above ground wellhead and leaching area. There will be minor amendments to the above ground layout of the equipment within each of the above ground wellhead areas due to changes in wellhead technology and materials for hydrogen compatibility, with no change to the size, location or number of the compounds themselves.

Site Roads

2.5.2.19 Modifications will be made to the internal site roads due to:

- Access to the new HAGI;
- Access to the new off-plot GPP utility compound;
- Modifications to the GPP layout; and
- Access to an additional GPP laydown area.

2.5.2.20 These changes are shown on below **Figure 2.4.** Any other potential road modifications will be minor and within the limits of deviation for the Consented Development; and are therefore not considered further within this Scoping Report.

TITLE

FIGURE 2.4 - HOLFORD BRINEFIELD - KGSP - GENERAL ARRANGEMENT GPP AREA - SITE ROADS - CONSENTED VS PROPOSED DEVELOPMENT

REV		CHKD BY	DATE
P1	ISSUED FOR INFORMATION	CR	04/03/25
REV	ALTERATIONS	CHKD BY	DATE

KEUPER GAS STORAGE LIMITED

BRINE AND WATER SECTION, NORTHWICH SITES,
HOLFORD BRINEFIELD, LOSTOCK GRALAM,
NORTHWICH, CHESHIRE, CW9 7TD.

DRAWN BY	[redacted]	DATE	04/03/25
CHECKED BY	[redacted]	DATE	04/03/25
TEL:			
EXT:			

APPROVED BY	
C	M
INST	E

ACC. No.		PROJECT No.	SCALE 1:1250
WORKS	PLANT REF.	APPLICATION No. EN030002	SIZE A1
GEOG. AREA (S)		DRAWING No. KEU-HYK1G-DRG-01-0042	REV P1

Flowlines

2.5.2.22 The gas pipelines and Gas Marshalling Compounds (GMC) are to be replaced with a hydrogen flowline arrangement for transferring hydrogen from the wellheads to the GPP. Changes to the configuration of the site gas distribution pipelines will be within the same corridors as those within the Consented Development.

2.5.2.23 The main differences between the two arrangements are as follows:

- Three 500-600 nominal bore (NB)[1] flowlines replace the 900 NB gas pipeline and the 200 NB first fill pipeline from the GPP to GMC3.
- The GMC and GMC3 compounds and associated valves are removed, with all the hydrogen flowlines underground between the GPP and wellhead compounds.
- The individual gas pipelines (200-300 NB) between the GMCs and individual wellheads are also not required as the flowlines will extend to each wellhead compound, with individual headers then branching off the flowline to the wellhead.

2.5.2.24 The requirement for pigging (the process of using devices called 'pigs' to clean, inspect or maintain pipelines) the flowlines between the wellheads and GPP has been allowed for in the Proposed Development. At the furthest end of each flowline, a pig launcher will be allowed for at the wellhead and associated pig receiver facility provided at the GPP.

Electrical High Voltage (HV) and Low Voltage (LV)

2.5.2.25 To power the GPP, a new 132 kV substation is required in order to feed a new 33 kV substation at the GPP. The connection is to be provided by ScottishPower Energy Networks (SPEN) and fed directly from the existing overhead 132 kV pylon. The location of this substation is to be amended from the Consented Development to align with the connection offer from the electrical Distribution Network Operator (DNO) SPEN.

2.5.2.26 Due to changes in the GPP, the 33 kV substation is proposed to be moved from the GPP compound to an off-plot utility compound. This also requires an amendment to the cable routing from the 132 kV Substation to feed the new location.

2.5.2.27 As per the Consented Development, the SMC3 is to be connected to an existing SPEN overhead 33 kV power cable. Since the Consented Development, it has been agreed with SPEN that the 33 kV supply would also be used to provide temporary construction power for the

[1] Nominal bore" (often abbreviated as NB) refers to the approximate internal diameter of a pipe, not the exact measurement, and is used as a standard way to designate pipe sizes.

GPP area and therefore an additional below ground 33 kV electrical cable is required from SMC3 to the GPP.

2.5.2.28 In addition to the amendments required to HV electrical, a new 11 kV diversion is required around the proposed HAGI area, due to the change in location of the NTS to the HAGI.

2.5.3 CHANGES TO CONSTRUCTION AND PHASING

2.5.3.1 The Consented Development provided information on construction methodology, programme and phasing. While there will be some amendments to the construction, these are all within the limits of deviation of the Consented Development and are based on new technologies and new versions of equipment since the consent in 2017.

2.5.3.2 The methodology for construction of the caverns will be as per the Consented Development.

2.5.3.3 As elements of the Proposed Development do not deviate from the Consented Development, these elements are being discharged, and early construction works began in 2022.

Programme

2.5.3.4 Construction of the Consented Development began in 2022. Elements of the Consented Development, which are not proposed to be amended in this MC, will continue to be discharged and constructed separate from the MC process.

2.5.3.5 Following approval of this MC, construction of elements of the Proposed Development will likely begin in 2028 and would start to become operational from 2030.

2.5.4 CHANGES TO OPERATION

2.5.4.1 As per the Consented Development, the overall Operation and Maintenance strategy will be finalised as part of the MC application however, it is unlikely to change significantly. Maintenance activities will be categorised into two levels: preventive and corrective maintenance. Preventive maintenance will be undertaken according to scheduled services whereas corrective maintenance will be required to address unexpected repairs, component replacements, retrofit campaigns and breakdowns.

2.5.4.2 All operational amendments to the Consented Development relate to the import and export of hydrogen gas through the new HAGI (consented through a separate application progressed by Cadent) and amended GPP.

Import Mode

2.5.4.3 When the hydrogen gas is imported from the network, it will pass through import metering and manifold on entering the Hydrogen

Storage Facility (through the HAGI). Within the GPP, the gas will be compressed and cooled for injection into one or more of the caverns. The gas in each of the caverns will be stored at a downhole pressure of up to 130 bar and at a typical temperature range of 5–40°C.

Export Mode

2.5.4.4 Hydrogen gas will be exported from the caverns to the network. The saturated gas withdrawn from the caverns will be de-sulphurised if required (hydrogen sulphide removal), de-pressurised, dried and cooled within the withdrawal train and exported via the fiscal metering. The Hydrogen Storage Facility will operate in either import or export mode in normal operations. The Hydrogen Storage Facility will have the ability for inter-cavern gas transfer.

Venting and/or Flaring

2.5.4.5 Venting and / or flaring of hydrogen will be required to support events such as periodic depressurisation of hydrogen systems, to allow a safe shutdown for routine and emergency situations, as well as to prevent the accumulation of a hazardous atmosphere within the plant. The application of venting and/or flaring will be made based on technical, health, safety and environmental reasoning, including guidance published by Government bodies.

Decommissioning

2.5.4.6 The Proposed Development is expected to operate for up to 40 years. If at the end of this period, or should KGSL determine earlier that the caverns are no longer required for gas storage, the Proposed Development's gas storage and handling infrastructure and operational land would be decommissioned. The Proposed Development will be decommissioned as per the Consented Development.

2.5.5 CHANGES TO PLANS AND DRAWINGS

2.5.5.1 At the time of writing the Scoping Report, it is not anticipated that any plans submitted for the Consented Development will be withdrawn. However, this will be reviewed for the Material Change as the design develops for the PEIR and ES. Whilst it is not expected any plans submitted for the Consented Development will be withdrawn for the Material Change, the proposed changes will be incorporated into revised and substitute plans which will be submitted with the MC application. A preliminary (but not exhaustive) list of the new, revised and retained plans to be updated is set out in **Table 2.2**. This list will be confirmed as the MC develops and detailed in the ES.

TABLE 2.2 - PROPOSED LIST OF NEW, REVISED & RETAINED PLANS

Drawing number	Title	Status
KEU-HYK1G-DRG-01-0002	GENERAL ARRANGEMENT SHOWING GPP AREA - DCO CONSENTED ARRANGEMENT VS MATERIAL CHANGE INDICATIVE ARRANGEMENT	New
KEU-HYK1G-DRG-01-0028	GENERAL ARRANGEMENT SHOWING MAIN SITE - CONSENTED DCO ARRANGEMENT VS MATERIAL CHANGE INDICATIVE ARRANGEMENT	New
KEU-HYK1G-DRG-01-0039	GENERAL ARRANGEMENT SHOWING MAIN SITE - CONSENTED DCO ARRANGEMENT VS MATERIAL CHANGE INDICATIVE ARRANGEMENT - ABOVE GROUND WORKS	New
KEU-HYK1G-DRG-01-0040	GENERAL ARRANGEMENT SHOWING MAIN SITE DCO ORDER LIMITS	New (as per the Consented Development)
KEU-HYK1G-DRG-01-0041	GENERAL ARRANGEMENT GPP AREA - GPP UTILITY COMPOUND - CONSENTED VS PROPOSED DEVELOPMENT	New
KEU-HYK1G-DRG-01-0042	GENERAL ARRANGEMENT GPP AREA - SITE ROADS - CONSENTED VS PROPOSED DEVELOPMENT	New
13-03-01-HOL-24-201	Phases of Development	To be updated as part of MC
13-03-01-HOL-24-202	Phases of Development	To be updated as part of MC
13-03-01-HOL-24-203	Phases of Development	To be updated as part of MC
13-03-01-HOL-24-204	Phases of Development	To be updated as part of MC

Drawing number	Title	Status
13-03-01-HOL-24-230	Overall Development - Key Plan	To be updated as part of MC
13-03-01-HOL-24-231	General Arrangement Showing Main Development Area - Sheet 1 of 3	To be updated as part of MC
13-03-01-HOL-24-232	General Arrangement Showing Main Development Area - Sheet 2 of 3	To be updated as part of MC
13-03-01-HOL-24-233	General Arrangement Showing Main Development Area - Sheet 3 of 3	To be updated as part of MC
13-03-01-HOL-24-240	Landscaping Details - Key Plan	To be updated as part of MC
13-03-01-HOL-24-248	Development at Wellhead H508	To be updated as part of MC
13-03-01-HOL-24-263	Gas Processing Plant and Construction of Access Roads	To be updated as part of MC
13-03-01-HOL-24-264	Gas Processing Plant and Gas Infrastructure Construction	To be updated as part of MC
13-03-01-HOL-24-266	Final Landscaping Details - Sheet 1 of 3 (GPP Area)	To be updated as part of MC
13-03-01-HOL-24-270	KGSP ELEVATIONS ON GAS PROCESSING PLANT	To be updated as part of MC
13-03-01-HOL-24-271	KGSP ELEVATIONS ON SOLUTION MINING COMPOUND	To be updated as part of MC
13-03-01-HOL-24-301	KGSP BRINE, WATER & GAS PIPELINE DITCH CROSSINGS PLUS NEW ROAD CROSSINGS - KEY PLAN	To be updated as part of MC
13-03-01-HOL-24-316	KGSP BROOK CROSSING GX1 FOR GAS PIPELINES	To be updated as part of MC
13-03-01-HOL-24-324	KGSP GAS PIPELINE ROAD CROSSING YL1 AT YATEHOUSE LANE	To be updated as part of MC

Drawing number	Title	Status
13-03-01-HOL-24-326	KGSP GAS PIPELINES ROAD CROSSING YL3 AT YATEHOUSE LANE	To be updated as part of MC
13-03-01-HOL-24-504	Below Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-505	Below Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-506	Below Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-510	Above Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-511	Above Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-512	Above Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-513	Below Ground Works Plan	To be updated as part of MC
13-03-01-HOL-24-514	Above Ground Works Plan	To be updated as part of MC

3. PLANNING AND POLICY CONTEXT

3.1 PLANNING AND CONSENTING CONTEXT

3.1.1 OVERVIEW – PLANNING HISTORY

3.1.1.1 A review of historical planning applications associated with the Holford Brinefields is summarised below in **Table 3.1** based on an assessment undertaken for the Development Consent Order (DCO) Application in 2015. This includes the wider planning context of the area surrounding the Scoping Boundary. The table has been updated to include recent applications within the Scoping Boundary from Cheshire West and Chester's Planning Register.

TABLE 3.1 - HISTORICAL PLANNING APPLICATIONS ASSOCIATED WITH THE HOLFORD BRINEFIELDS[2]

Planning Reference	Date	Description
Holford Brinefields Planning History		
7/10/65	27/11/1953	Brine Extraction and Waste Disposal
3/5/123	27/11/1953	Brine Extraction and Waste Disposal
3/5/884	27/11/1953	Brine Extraction and Waste Disposal
3/5/1945	30/08/1954	Brine Extraction and Waste Disposal
3/5/4645	01/06/1961	Brine Extraction
3/5/8376	15/12/1967	Brine Extraction
3/5/9161	15/01/1969	Brine Extraction
3/5/9734	16/10/1969	Brine Extraction
4/3235	19/04/1977	Brine Extraction
4/00/03423	27/04/1977	Disposal of Chemical Waste
4/00/06431	23/05/1979	Deposit of Halogenated Residues in Sealed Underground Rock Salt Cavities

[2] Cheshire West and Chester (2025) Planning Search Available at: https://pa.cheshirewestandchester.gov.uk/online-applications/

Planning Reference	Date	Description
4/00/11896	26/07/1983	Storage of Gas in Underground Salt Cavity at Holford Brinefield with Associated Wellhead Compound and Pressure Reduction Station Sited 150 m NW of Wellhead
4/22880	10/10/1990	Installation of Five Demountable Towers (7 m high) for the Provision of a Close Circuit Television Security System
4/22881	10/10/1990	Installation of Two Demountable Towers (7 m high) for the Provision of a Close Circuit Television System
4/32984/CCC	C 02/02/1998	Submission of Revised Conditions for the Continued Extraction of Rock Salt as Required by the Environment Act 1995
4/APP/2001/0415/CCC	26/03/2001	Application for Hazardous Substance Consent for the Storage of Natural Gas in Underground Cavities
APP/2001/0454	03/04/2001	Hazardous Substances Consent to Store Natural Gas in Underground Cavities
APP/2001/0415	04/04/2002	Hazardous Substances Consent for the Storage of Natural Gas in Underground Cavities at Land Around Drakelow Lane and the Former Cranage Airfield Site
4/APP/2002/0234 & 8	18/02/2002	Works, Including Drilling of Exploratory Well and Other Boreholes, Laying of Pipelines (Water/Brine),

Planning Reference	Date	Description
		Controlled Solution Mining of Rocksalt to Create up to 8 Underground Cavities for the Storage of Natural Gas, Conversion of 6 Existing Cavities to Saturators, Laying of Gas Pipelines, Construction of Above Ground Gas Processing Plant, Access Roads, Landscaping and Ancillary Development
4/32984/02/CCC	21/08/2002	Proposed Additional Cavities and Required Infrastructure
4/05/2102/FZ5	30/11/2006	Works Including Drilling Boreholes, Laying of Pipelines (Water/Brine), Controlled Solution Mining of Rocksalt to Create up to 28 Underground Cavities for the Storage of Natural Gas and use of Cavities for the Storage of Natural Gas, Laying of Pipelines, Construction of Above Ground Gas Compressor Station and Solution Mining Compound, Access Roads, Landscaping and Ancillary Development; at Lostock Hollows in the north, Drakelow Lane in the South.
06-1900-HAZ	09/10/2006	Continuation of Hazardous Substances Consent Following the Change of Control of the H165 Gas Storage Cavity at Holford from NG Gas to INEOS Enterprises
4/07/0015/FZ5/CCC	15/01/2007	Application made under Planning Condition 10 of

Planning Reference	Date	Description
		4.32984 and 5/98/0192P for 4 new boreholes and Cavities, together with extensions to site roads and new pipelines linking into existing Cavities and pump-house
07/0015/FZ5	20/03/2007	Four New Boreholes
07/2891/FUL	14/11/2007	Installation of Utility Pipeline and Conduits 50mm Water Pipe, 110 mm Brine Pipe and BT Cable Duct)
10/02683/MIN	23/11/2010	Associated Development to the Holford Brinefield Drilling Programme 2010 Including the Laying of Pipelines and Cables
12/03526/MIN	01/08/2012	1 km of New Buried Pipework to be Installed to Connect Four Existing Boreholes in the Saturator Network on Birches Lane Site
14/05318/MIN	13/02/2014	2.4 km new buried pipework 8”, 10” and 14” diameter to connect boreholes to the saturator network
14/05319/MIN	13/02/2014	Extend Brine, mud and DBO pipework
Relevant updates to Site Planning History		
15/00117/HAZ	16/07/2015	Continuation of Hazardous Substances Consent 14/03374/HAZ (latest application) 4/08/0841/FZ5 (original application) associated with transfer of ownership from Ineos

Planning Reference	Date	Description
		Enterprises to Keuper Gas Storage Limited
16/01362/HAZ	12/05/2016	New hazardous substances consent for the storage of natural gas
15/03221/HAZ	31/08/2016	Continuation of Hazardous Substances Consent 15/00117/HAZ (latest application) 4/08/0841/FZ5 (original application) associated with transfer of ownership from Ineos Enterprises to Keuper Gas Storage Limited
21/03902/REQ	15/02/2022	Detailed Requirement Submission for Phase 1, Stage 1 of Keuper Gas Storage Project (details below)
21/04921/HAZ	22/12/2022	Hazardous Substances consent for the presence by means of storage, compression and treatment of hydrogen gas, a hazardous substance, on, over or under land off King Street, Byley, Cheshire
21/03110/DIS	12/01/2023	Discharge of condition 10 of planning permissions 4/32984 and 5/98/0192P
24/00480/DIS	Awaiting decision, received 16/02/2024	Discharge of condition 10 (details to be agreed prior to the commencement of development within a development phase) of planning permissions 4/32984 and 5/98/0192P

Source: Zyda Law, Keuper Gas Storage Project - Project Overview, November 2015 and Cheshire West and Chester Online Planning Register.

3.1.2 THE EXISTING DCO – STATUS

3.1.2.1 The existing 2017 Keuper Gas Storage Project (KGSP) DCO was granted by the Secretary of State on 15 March 2017, coming into force 5 April 2017. A subsequent Correction Order for minor errors came into force 8 August 2017. An Amendment Order came into force 16 May 2024, following an application for a Non-Material Change which proposed amendments to the Order to allow the inclusion of hydrogen gas storage in the definition of gas storage, the substitution (update of) various Certified Plans, and the update to the registered address of the Undertaker. Changes relating to the storage of hydrogen were not approved, with the Amendment Order only including changes relating to address details and the substitution of various Certified Plans.

3.1.2.2 An application was approved by Cheshire West and Chester Council on 15 February 2022 for the submission of details relating to the following Requirements (ref. 21/03902/REQ) to enable the construction of access roads:

- 3 – Construction/Environmental Management Plan
- 4 – Approval of Details ((a)(vi), (b), (c), (d), (e))
- 6 - Landscaping
- 7 – Access to Works (excluding watercourse crossing and culverting)
- 11 – Fencing and Other Means of Enclosure
- 12 – Ground and Surface Water and Pollution Prevention
- 13 - Hedgerows
- 15 – Archaeology
- 21 - European Protected Species
- 24 – Control of Radio Emissions

3.1.2.3 Following the approval of the above details, work commenced on site. The DCO has been implemented through the construction of access roads, and this was confirmed by a letter from Cheshire West and Chester Council (dated 28 July 2023) to state that the project had lawfully commenced.

3.2 POLICY CONTEXT

3.2.1 INTRODUCTION

3.2.1.1 National, regional, and local policies are relevant to the consideration of the Proposed Development. At all levels, policies are designed to protect, and where possible, appropriately enhance the environment. This chapter of the Scoping Report aims to identify the relevant policies so that the policy context is clear and provides the context for the Scoping Opinion.

3.2.1.2 The area identified within this report, and for the location of the Proposed Development site, is covered by Cheshire West and Chester

Council (CWACC) and Halton Borough Council (HBC) as the Local Planning Authorities (LPA). This chapter also reviews the planning policy of the LPAs relevant to the Proposed Development.

3.2.2 NATIONAL POLICY

National Policy Statements

3.2.2.2 In July 2011 the UK government adopted a suite of NPSs that apply to NSIPs, including the Overarching NPS for Energy (EN-1)[3] and NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)[4]. The most recent update to these NPSs was in January 2024.

3.2.2.3 Whilst EN-1 is the only NPS directly applicable to hydrogen storage infrastructure projects, there are aspects of EN-4 that must be considered due to their relevance to the Proposed Development.

Overarching NPS for Energy (EN-1) 2024

3.2.2.4 EN-1 provides overarching national policy support for energy infrastructure. In Paragraph 1.3.5 of EN-1, hydrogen storage infrastructure is referenced as outside of the scope of other NPS, and in this case, EN-1 is the primary NPS to have effect as the basis for Secretary of State's decision making. The partial relevance of EN-4 is set out below.

3.2.2.5 In Section 3.4, the need for new nationally significant gas infrastructure is set out, which includes the need for low carbon hydrogen infrastructure, with reference to the Hydrogen Strategy which 'recognises the critical enabling role that hydrogen transportation and storage (T&S) infrastructure will need to play in connecting hydrogen producers with consumers and balance misalignment in supply and demand.' (3.4.19).

3.2.2.6 In recognition of the 'urgent need' for this infrastructure, hydrogen storage is considered to be Critical National Policy (CNP) Infrastructure (3.4.22)

3.2.2.7 CNP Infrastructure is strongly supported by the Government and at paragraph 3.3.63 states that this need 'will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy.'

[3] DESNZ (2023). Overarching NPS for Energy (EN-1). Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1/overarching-national-policy-statement-for-energy-en-1

[4] DESNZ (2023). National Policy Statement for Natural Gas Supply Infrastructure for Natural Gas Supply Available at: https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf

EN-1 NPS Assessment Principles

3.2.2.8 EN-1 contains sections on generic and technology specific assessment principles and potential impacts which will guide applications and decision making by the Secretary of State. Assessment Principles for the infrastructure covered by the Overarching NPS for Energy (EN-1) are set out at Part 4 of EN-1. It states that the Secretary of State will start the decision-making process with a presumption in favour of granting consent for energy NSIPs, given the level and urgency of need for infrastructure of these types.

3.2.2.9 The policy states that 'In considering any proposed development, and in particular when weighing its adverse impacts against its benefits, the Secretary of State should take into account:

- its potential benefits including its contribution to meeting the need for energy infrastructure, job creation, reduction of geographical disparities, environmental enhancements, and any long-term or wider benefits
- its potential adverse impacts, including on the environment, and including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for any adverse impacts, following the mitigation hierarchy'

3.2.2.10 Therefore, the general assessment principles of the NPS requires that environmental, social and economic benefits and adverse impacts, at national, regional and local levels should be considered when assessing a proposed development.

Critical National Priority Infrastructure

3.2.2.11 At paragraph 4.1.7 the qualification of a project as CNP infrastructure is stated as increasing the likelihood that any residual effects of the development will be outweighed by the need case. Residual effects result where the Secretary of State considers that a project, as required by a NPS, has mitigated an impact as far as possible but effects may remain. This presumption does not apply to residual effects in relation to human health and public safety, defence, irreplaceable habitats or unacceptable risk to the achievement of net zero.

3.2.2.12 Qualification as CNP Infrastructure does not disqualify the need for an applicant to demonstrate that the project has met the requirements of the NPS, applying the mitigation hierarchy and aligning with legal and regulatory requirements.

3.2.2.13 The Applicant has had due regard to the relevant assessment principles and guidance on impacts in preparing this Scoping Report and will continue to do so in developing the Proposed Development and the application.

NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

3.2.2.14 Whilst there is reference in EN-4 to hydrogen developments, the guidance within this NPS has effect only for natural gas infrastructure. However, there are aspects within this NPS that are relevant to the Proposed Development, and at paragraph 1.6.6, there is provision for the applicability of the guidance within this NPS where it relates to 'other matters which the Secretary of State thinks are important and relevant to their decision on applications for hydrogen infrastructure'.

3.2.2.15 The NPS addresses the use of salt caverns for the storage of gas, indicating the use of salt caverns for the storage of gases is considered acceptable in principle by the Government subject to criteria set out in the NPS.

3.2.2.16 At Section 2.8 there is consideration of site selection criteria and impacts for mitigation for underground natural gas storage developments. The following assessment criteria, whilst directly applicable only to natural gas storage, are relevant considerations for the Proposed Development:

- Noise and vibration
- Gas emissions
- Water quality and resources
- Disposal of brine

3.2.2.17 The above guidance will be taken into account for relevant aspects of the Proposed Development.

The National Planning Policy Framework

3.2.2.18 The National Planning Policy Framework (NPPF)[5] was updated in December 2024 and sets out the Government's Planning Policies for England and how these should be applied. It provides a framework for locally prepared plans.

3.2.2.19 The Policies contained within the NPPF are expanded upon and supported by the Planning Practice Guidance.

3.2.2.20 Paragraph 5 of the NPPF states:-

"The Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the decision- making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning

[5] Ministry of Housing, Communities, and Local Government (2024). Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

policy, and may be a material consideration in preparing plans and making decisions on planning applications."

3.2.2.21 Notwithstanding, sections of the NPPF that may be of relevance to the scope of the Proposed Development include:

- 2 - Achieving sustainable development;
- 6 - Building a strong, competitive economy;
- 11 - Making effective use of land;
- 12 - Achieving well designed places;
- 13 – Protecting Green Belt land;
- 14 - Meeting the challenge of climate change, flooding, and coastal change;
- 15 - Conserving and enhancing the natural environment;
- 16 - Conserving and enhancing the historic environment; and,
- 17 – Facilitating the sustainable use of minerals.

3.2.2.22 Paragraph 7 of the NPPF confirms that "the purpose of the planning system is to contribute to the achievement of sustainable development". Paragraph 8 confirms that achieving sustainable development "means that the planning system has three overarching objectives" which are economic, social and environmental. The economic objective includes the need to identify and co-ordinate the provision of infrastructure; the social objective aims to support strong, vibrant and health communities; and the environmental objective aims "to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

3.2.3 LOCAL POLICY

Local Plans - Cheshire West and Chester Council

3.2.3.2 Most of the Scoping Boundary is within the Borough of Cheshire West and Chester. The Local Development Plan is in two parts – Part 1: Strategic Policies; and Part 2: Land Allocations and Detailed Policies.

3.2.3.3 There are also several Supplementary Planning Documents which cover topics related to the Proposed Development.

The Cheshire West and Chester Local Plan (Part One) Strategic Policies (2015)

3.2.3.4 Part One of the Local Plan[6] provides the overall vision, strategic objectives and spatial strategy for the borough to 2030.

3.2.3.5 Policies relevant to the Proposed Development include:

- SO10 – North Cheshire Green Belt
- SO16 – Sustainable Waste Management
- STRAT 1 – Sustainable Development
- STRAT 8 – Rural Area
- STRAT 9 – Green Belt and Countryside
- STRAT 10 – Transport and Accessibility
- STRAT 11 – Infrastructure
- ECON 1- Economic growth, employment and enterprise
- ECON 3 – Visitor economy
- SOC 5 – Health and wellbeing
- ENV 1 – Flood risk and water management
- ENV 2- Landscape
- ENV 4 – Biodiversity and Geodiversity
- ENV 5 – Historic Environment
- ENV 6 – High quality design and sustainable construction
- ENV 9 – Minerals supply and safeguarding

The Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies (2019)

3.2.3.6 Part Two of the Local Plan[7] provides further detailed policies and land allocations to support the strategic objectives and policies in the Local Plan (Part One), also to 2030.

3.2.3.7 Policies relevant to the Proposed Development include:

- DM11 – Manchester Airport safeguarding zone
- DM12 – Jodrell Bank Radio Telescope consultation zone

---

[6] Cheshire West and Chester Council (2015). Available at: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-one

[7] Cheshire West and Chester Council (2019). Available at: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-two

- DM17 – Advertisement Control Order
- DM44 – protecting and enhancing the natural environment
- DM45 – Trees, woodland and hedgerows
- M4 – Proposals for exploration, appraisal or production of hydrocarbons
- M6 - Salt and brine working (controlled brine extraction) preferred area
- ENV1 – Flood Risk and water management
- EN4 – Biodiversity and geodiversity
- ENV9 – Minerals supply and safeguarding
- N1 – Northwich Settlement area

Cheshire West and Chester – Supplementary Planning Documents

3.2.3.8 The following Supplementary Planning Documents (SPD) are relevant to the Proposed Development:

- Oil and Gas Exploration, Production and Distribution SPD (2017)[8]

LOCAL PLANS - HALTON BOROUGH COUNCIL

3.2.3.9 Halton's Development Plan consists of two documents: Delivery and Allocations Local Plan (2022)[9] and the Joint Merseyside and Halton Waste Local Plan (2013)[10]. The former is relevant to the Proposed Development, with policies in place until 2037.

3.2.3.10 There are a number of current Supplementary Planning Documents (SPD) and several in development that are relevant to the Proposed Development.

Halton Borough Council Delivery and Allocations Local Plan (2022)

3.2.3.11 Relevant policies to the Proposed Development include:

- GR1 – Design of Development

[8] Chesire West and Chester Council (2017). Available at: https://consult.cheshirewestandchester.gov.uk/file/4527789

[9] Halton Borough Council (2022). Available at: https://www3.halton.gov.uk/Documents/planning/planning%20policy/newdalp/DALP%20Adopted.pdf

[10] Waste Planning Merseyside (2013). Available at: https://www.wirral.gov.uk/files/joint-waste-local-plan-front.pdf/download?inline

- C3S (R) 4 - Employment Land Supply
- CS (R) 7 – Infrastructure Provision
- CS (R) 18 – High Quality Design
- CS (4) 19 - Sustainable Development and Climate Change
- CS (R) 20 – National and Historic Environment
- CS28 Managing Pollution and Risk
- CS24 – Waste
- C1 – Transport Network and Accessibility
- ED1 – Employment Allocations
- ED2 – Employment Development
- ED3 – Complementary Services and facilities within Employment Areas
- HE3 – Waterways and Waterfronts
- HE7 – Pollution and Nuisance
- HE9 – Water Management and flood risk

Halton - Supplementary Planning Documents

3.2.3.12 The following Supplementary Planning Documents (SPD) are relevant to the Proposed Development:

- Design of New Industrial and Commercial Development (2006)

3.2.3.13 The following SPDs are currently being prepared, and may be relevant to the Proposed Development:

- Climate Change SPD
- Transport and Accessibility SPD

3.2.4 EMERGING POLICY

3.2.4.1 With the exception of Supplementary Planning Documents currently being prepared by Halton Borough Council, at the local level there is not expected to be a change in policy through the development of new Local Plans during the consideration of this application.

3.2.4.2 At the National Level, the relevant NPS to the Proposed Development (EN-1) was last updated in January 2024. An update to this document has not yet been announced.

3.2.4.3 Relevant policy updates will be considered as the Proposed Development progresses.

4. ALTERNATIVES

4.1 INTRODUCTION

4.1.1.1 Schedule 4 (paragraph 2) of the 2017 EIA Regulations require all applicants to identify how preferred options have been selected and the rationale behind all of the alternatives considered by the developer. The PEIR and ES will outline the options considered for the Proposed Development and justify the primary reasons for selecting specific options, considering environmental effects, technical feasibility and the overall objectives of the project. Furthermore, the EIA shall consider a 'do nothing option' which will identify the expected evolution of the baseline scenario without implementation of the Proposed Development.

4.1.1.2 This chapter summarises the decision-making process followed to date to consider alternatives for the Proposed Development. The PEIR and ES shall provide additional detail on the design evolution and selection processes which have evolved as a result of best practice engineering advice, the EIA process and following stakeholder feedback in the Scoping Opinion.

4.2 DO NOTHING OPTION

4.2.1.1 The 'Do Nothing' alternative would mean that the Proposed Development would continue to be progressed as per the consented Development. This would be the development of an underground storage facility for natural gas only.

4.2.1.2 The National Policy Statement for Natural Gas Supply Infrastructure highlights the need for efficient import, storage, and transmission of natural gas to meet current energy demands while developing low-carbon alternatives.

4.2.1.3 However, the UK is actively phasing out natural gas in favour of hydrogen as part of its strategy to reduce carbon emissions and achieve its net-zero target by 2050. The UK Hydrogen Strategy outlines a comprehensive plan to develop a low-carbon hydrogen sector which includes replacing natural gas with hydrogen in various sectors, with the government investing in hydrogen infrastructure, such as pipelines and storage facilities, and supporting innovation to reduce costs and enhance efficiency. By leveraging hydrogen's potential, the UK aims to decarbonize its energy system, reduce reliance on fossil fuels, and enhance energy security.

4.2.1.4 UK Government policy specifies that "there is an urgent need for all types of low carbon hydrogen infrastructure to allow hydrogen to play its role in the transition to net zero". Storage capacity will be an integral component in a hydrogen economy, balancing supply from production facilities with demand by consumers. Hydrogen storage therefore will play a critical role in supporting the delivery of the UK Government's legally binding net zero targets. The Proposed

Development is one of many projects working to deliver a net zero future as well as decarbonising the north-west region, as part of the HyNet north-west cluster to reduce carbon dioxide emissions by millions of tonnes every year from 2030.

4.2.1.5 Whilst the Consented Development for a 50 year natural gas only storage facility has been accepted and remains a viable storage capacity option which can be constructed, UK policy and targets for net zero and energy security favour a hydrogen storage option.

4.3 SCOPING BOUNDARY

4.3.1.1 Following design evolution and confirmation from the engineers that the construction methodology for cavern creation would not change specifically for hydrogen storage, the decision has been made to keep the Scoping Boundary the same as boundary of the Order Limits for the Consented Development. This Scoping Boundary is defined as the area within which it is currently understood the Proposed Development will be physically located, including the temporary work areas. The application boundary may be refined between scoping and the PEIR and ES however it is not anticipated that this would increase beyond the Order limits of the Consented Development.

4.3.1.2 Whilst options for alternative locations of the site layout infrastructure are proposed, none of these changes will fundamentally affect the overall size of the Scoping Boundary for the construction and operation of the Hydrogen Storage Facility. Hence, the overall footprint of the site will remain as per the Consented Development.

4.4 HYDROGEN STORAGE FACILITY SITE SELECTION

4.4.1.1 As discussed in detail below, the Proposed Development site is one of a small number of locations in the north-west of England that could provide hydrogen storage at scale for the HyNet project. It has the benefit of already having consent for the storage of natural gas, requires no additional compulsory purchase of land and can therefore meet the timelines required by DESNZ for the provision of such facilities in the UK.

4.4.1.2 Hydrogen is one of the few readily available gases which has the potential to not only generate other forms of power, e.g., electricity, but to also decarbonise a wider spectrum of sectors, such as:

- Transportation (e.g., automotive and rail industries);
- Chemical Processing;
- Manufacturing (both glass and steel); and
- Aerospace and Defence.

4.4.1.3 As noted above, the north-west of England is a key strategic location to construct the Proposed Development. The HyNet cluster provides significant demand and once hydrogen is readily available in large

quantities; there will be many local and national off takers who will have a willingness to invest in the gas.

4.4.1.4 Availability of storage facilities is a key factor in securing a consistent supply of hydrogen to off takers. It is a critical component of the HyNet north-west cluster and the proposals to transport hydrogen via the HyNet North-West Hydrogen Pipeline.

4.4.1.5 As part of the HyNet north-west cluster, the Proposed Development will contribute to the rapid decarbonisation of the region and will also support the UK Government's wider commitments to achieve Net Zero before 2050.

4.4.1.6 The characteristics of the geological deposits in the local area are vital for the effective delivery of an underground gas storage project. An evaluation of geological conditions for Keuper Gas Storage has already been undertaken as part of the investigations carried out for the Consented Development in Report 9.1 KGSP Seismic Survey Report of the Consented Development (November 2015). Furthermore, an additional evaluation of the geological conditions (including updated seismic surveys) was specifically undertaken for the hydrogen storage facility as part of the Non-Material Change to the Consented Development in 2022, which was summarised in Document 9.1, Seismic Survey Report- Revision A for the Non-Material Change Application.

4.4.1.7 The Proposed Development is part of the Northwich Halite salt formation with the geology of the region being primarily Triassic, of Anisian age (about 230 million years ago). The average depth of the top of Northwich Halite salt formation estimated by the seismic interpretation ranges between 320 and 500 meters below Ordnance Datum (O.D.), and the thickness of the salt is in the range of 236 and 293 meters. The thick layers of salt make the Proposed Development site a suitable area for underground gas storage and the history of solution mining at Holford Brinefield in close proximity to the Site further supports the case for cavern creation for hydrogen storage.

4.4.1.8 The assessment of geology and ground conditions for the Consented Development has provided geological understanding and site-specific experience which would not have been available should another site have been chosen without extensive investigation that might not identify a site suitable for development. This is supplemented by additional investigation and assessment specifically for the proposed hydrogen development.

4.4.1.9 The use of solution mining as a way of excavating the storage caverns is a proven technology and has been utilised for the Stublach Gas Storage Project and the surrounding Holford Brinefields. This was also the method proposed for the Consented Development.

4.4.1.10 The specific layout for the Proposed Development is based on the Consented Development and has been further optimised for the

Proposed Development, tailored for the underground storage of hydrogen. The benefits of this proposed layout include the fact that the GPP, wellhead and leaching area all have consented landscape screening which is included in the Consented Development. Whilst many of the existing landscape screening measures were proposed almost 9 years ago, these will be further adapted specifically for the Proposed Development to minimise local visual impacts, where possible.

4.5 ATMOSPHERIC VENTING AND FLARING OPTIONS

4.5.1 OVERVIEW

4.5.1.1 A safety system to facilitate the release of the hydrogen gas will be required within the GPP if elements of the facility need to be depressurised. Typically, this will only occur for short daytime durations a few times per year during planned maintenance. However on very rare occasions, depressurisation may also be required in the event of an emergency, a fault, or any process disturbance leading to the lifting of pressure safety valves (PSVs). The release route will be to atmosphere, with both venting and flaring currently under consideration.

4.5.1.2 A number of options for venting and flaring remain under consideration, as described below in Sections 4.5.2 - 4.5.4, and will be evaluated on the basis of a number of factors including safety, environmental considerations and cost.

4.5.1.3 Whilst the suitability of each option will be discussed in this section of the Scoping Report, the confirmed option to use venting or flaring (elevated flare or enclosed ground flare) will be confirmed in the PEIR and ES following further design evolution and discussions with the relevant authorities.

4.5.2 ATMOSPHERIC VENTING

4.5.2.1 Atmospheric vents are straightforward, reliable and economic technologies that release hydrogen directly into the atmosphere at the top of an elevated vent stack. To enable adequate dispersion of the gas to below the lower flammability limits, a sufficient sterile zone and hazardous area classification is required around the vent stack.

4.5.2.2 From a safety perspective, the height of the vent stack will be designed to ensure the hydrogen gas is released at a high enough elevation to not adversely affect any members of the public or site equipment / personnel. As the density of hydrogen emitted in emergency shutdown or maintenance would be very low, this would be rapidly dispersed into the atmosphere above the vent stack.

4.5.2.3 Hydrogen is an indirect greenhouse gas (GHG) and the release of hydrogen in large quantities can adversely impact the local chemistry of the atmosphere. Alongside this, hydrogen is a valuable resource

and therefore, the discharge of hydrogen to the atmosphere will be limited, as low as reasonably possible for maintenance and in emergency depressurisation events only.

4.5.3 ELEVATED FLARE

4.5.3.1 An elevated flare comprises an elevated stack, with a flare tip located at the top which only burn hydrogen very occasionally during emergency depressurisation events and maintenance. The hydrogen emitted as part of a depressurisation event will be sent to the flare and combusted, resulting in water vapour being emitted into the atmosphere. Combustion of hydrogen in air will also normally create localised increases in nitrogen oxides (NOx) concentration in comparison to natural gas and consequently, further assessment will be undertaken.

4.5.3.2 The stack height will be designed to guarantee the thermal radiation from the flame does not affect members of the public, site personnel or site equipment. Considering the high combustion temperature of hydrogen, the material selection of the stack and flare tip would require consideration to ensure mechanical stability of the stack.

4.5.3.3 The elevated flare would create a clear or pale blue flame when burning hydrogen which would be evident to the local area in the vicinity of the site at night and would likely be almost invisible in daylight.

4.5.4 ENCLOSED GROUND FLARE

4.5.4.1 The enclosed ground flare (EGF) would combust the hydrogen at the flare tip and be located within an enclosed chamber (of which the design configurations are still under consideration) at ground level.

4.5.5 SUMMARY

4.5.5.1 As discussed above, both the venting and flaring options for emergency depressurisation and maintenance have advantages and the decision on which option to adopt will be confirmed in the PEIR and the ES. This decision will be taken specifically for the Proposed Development based on increased engineering design and will be evaluated against safety and environment (namely Landscape and Visual Impact and Air Quality impacts) with the use of a weighting criteria, based on the 2017 EIA regulations and other legal guidance from statutory bodies.

4.6 SOLUTION MINING COMPOUND (SMC) SELECTION

4.6.1.1 For the Consented Development, the construction of a new Solution Mining Compound (named ‘SMC3’ in application documents) was proposed near the centre of the site to undertake the solution mining to create the gas caverns. The consented SMC footprint was approximately 80 m x 130 m, and the SMC contained various ancillary equipment, such as water booster pumps, weak brine pumps,

degassing equipment, control equipment and nitrogen storage and distribution.

4.6.1.2 For the Proposed Development another option has been considered for the solution mining of caverns. To use an existing SMC at Stublach (named SMC2) instead of constructing SMC3.

4.6.1.3 Following a series of design workshops and engineering studies, it was decided that the option to use the SMC2 at Stublach would be taken forward for solution mining and the area which was previously the proposed SMC3 in the Consented Development would be retained for other utilities.

4.6.1.4 SMC3 will still contain the electrical compound and switch room, control equipment, nitrogen storage and distribution as described within the Consented Development. The SMC and associated infrastructure will not be built at this location.

4.6.1.5 The primary reasons why the SMC2 at Stublach has been selected is that it has already been constructed in close vicinity to the Proposed Development site and the compound itself is operational for solution mining to create the caverns for the Stublach Gas Storage Project.

4.7 REFINEMENT AND NEXT STEPS

4.7.1.1 To conclude, whilst this alternatives chapter outlines the key options considered for the Proposed Development in terms of the Scoping Boundary, hydrogen storage facility, flaring and venting, and the SMC, and the Proposed Development design is on-going and will be refined in further detail for the PEIR and ES.

4.7.1.2 As the Proposed Development design evolves further through scoping opinion feedback, other consultation responses and engineering recommendations any more alternatives that become apparent will be reported in the PEIR and ES.

5. METHODOLOGY

5.1 INTRODUCTION

5.1.1.1 This chapter outlines the methodology adopted for the Environmental Impact Assessment (EIA) to support the preparation of the Preliminary Environmental Information Report (PEIR) and the Environmental Statement (ES). It describes the approach used to identify and assess environmental effects. It also outlines how the temporal, spatial and technical scopes of the EIA are developed.

5.1.1.2 In accordance with the Planning Act 2008 and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'), the EIA process for the Proposed Development includes the following:

- establishing, through consultation, the scope of the EIA including obtaining a Scoping Opinion from the Secretary of State;
- describing where potential technical and environmental alternatives have been considered;
- establishing a comprehensive understanding of the existing baseline environmental and socioeconomic conditions for the land within the draft Order Limits and the relevant study areas for each topic;
- identifying the potential environmental effects which may result from the Proposed Development;
- determining how the potential environmental effects may be avoided, reduced or off-set through informed design and / or further mitigation and how its benefits may be enhanced;
- identifying the likely residual effects which may result from the Proposed Development, taking account of the aforementioned mitigation measures; and
- assessing the significance of the potential environmental effects in conjunction with other effects arising from the Proposed Development and those from other neighbouring developments and / or sources (cumulative effects).

5.1.1.3 Further details for individual topic methodologies are provided in **Technical Appendices A-M**.

5.2 EIA PROCESS, REGULATIONS AND GUIDANCE

5.2.1.1 The EIA is a process which originated under the conditions of the European Union Directives 85/337/EEC and 97/11/EC on the assessment of the effects of certain public and private projects on the environment. The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018 have allowed a continuation of the process of EIA consistent with the Directive following the UK's departure from the European Union.

5.2.1.2 The key objective of an EIA is outlined in Article 2 of the directive which states that "Member States shall adopt all measures necessary to ensure that, before consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects."

5.2.1.3 The Article 8 of the Directive specifies that "the results of consultations and information gathered pursuant to (the EIA procedure) must be taken into consideration in the development consent procedure".

5.2.1.4 The requirements of the EIA Directive for developments defined as a NSIP by the Planning Act 2008 are written into UK law through the 2017 EIA Regulations (these are covered under the Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018). These regulations outline the statutory process and minimum requirements for the provision of adequate environmental information to enable the EIA process. The Scoping Report is provided in accordance with Regulation 10 of the 2017 EIA Regulations.

5.2.1.5 Regulation 14 and Schedule 4 detail the required information to be included in an ES. The ES will inform the discoveries of the EIA and its associated activities including survey findings, modelling outputs, and additional studies.

5.2.1.6 The EIA process is a systematic approach designed to identify, evaluate, and mitigate the likely significant environmental effects of a proposed development. The primary objective of EIA is to assess potential environmental impacts at an early stage of development, allowing for the identification of appropriate mitigation measures taken to avoid, reduce, or offset adverse effects. These mitigation measures are then integrated into the design of the proposed development or committed to through environmentally sensitive construction methods and practices.

5.2.1.7 The EIA also serves to inform key decision-makers, the Planning Inspectorate (who will examine the application and make a recommendation to the Secretary of State whether consent should be granted), statutory consultees such as planning authorities, about the Proposed Development. In addition, it ensures that stakeholders, including local communities, are made aware of the environmental impacts of the development.

5.2.1.8 The EIA assesses effects in relation to environmental receptors, that is: people (e.g. residents of buildings, users of facilities, employees of businesses), built resources (e.g. listed buildings) and natural resources (e.g. protected species, sites of ecological importance).

5.2.1.9 The EIA will also be undertaken with reference to the following documents (plus topic-specific guidance), amongst others:

- The Overarching National Policy Statement (NPS)[11] for Energy (EN-1) and NPS for Oil and Gas Supply and Storage (EN-4)[12];
- Guidelines for Environmental Impact Assessment, Institute of Environmental Management and Assessment (IEMA), 2004[13];
- the Planning Inspectorate's Advice on EIA Consultation and Notification, 2024[14];
- the Planning Inspectorate's Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements Version 7,2020[15];
- the Planning Inspectorate's Advice Note Nine: Rochdale Envelope Version 3, 2018[16];
- the Planning Inspectorate's Advice on Cumulative Effects Assessment, 2024[17];
- Delivering Proportionate EIA, A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice, IEMA 2017[18].

5.3 BASELINE OF THE EIA

5.3.1.1 Schedule 4 of the 2017 EIA Regulations (paragraphs 3 and 4) requires the EIA baseline to provide:

- *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; and*
- *A description of the factors specified in Regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological*

[11] DESNZ (2023). Overarching NPS for Energy (EN-1). Available at: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK
[12] DESNZ (2023). NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at: EN-4 Overarching National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines.
[13] IEMA (2004). Guidelines for Environmental Impact Assessment
[14] The Planning Inspectorate (2017). Advice on EIA Notification and Consultation. Available at: Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation - GOV.UK.
[15] The Planning Inspectorate (2020). Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements. Available at: Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements - GOV.UK.
[16] The Planning Inspectorate (2018). Advice Note Nine: Rochdale Envelope. Available at: Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope - GOV.UK.
[17] The Planning Inspectorate (2019). Advice on Cumulative effects assessment relevant to nationally significant infrastructure projects. Available at: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK.
[18] IEMA (2017). Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK EIA Practice. Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia.

changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

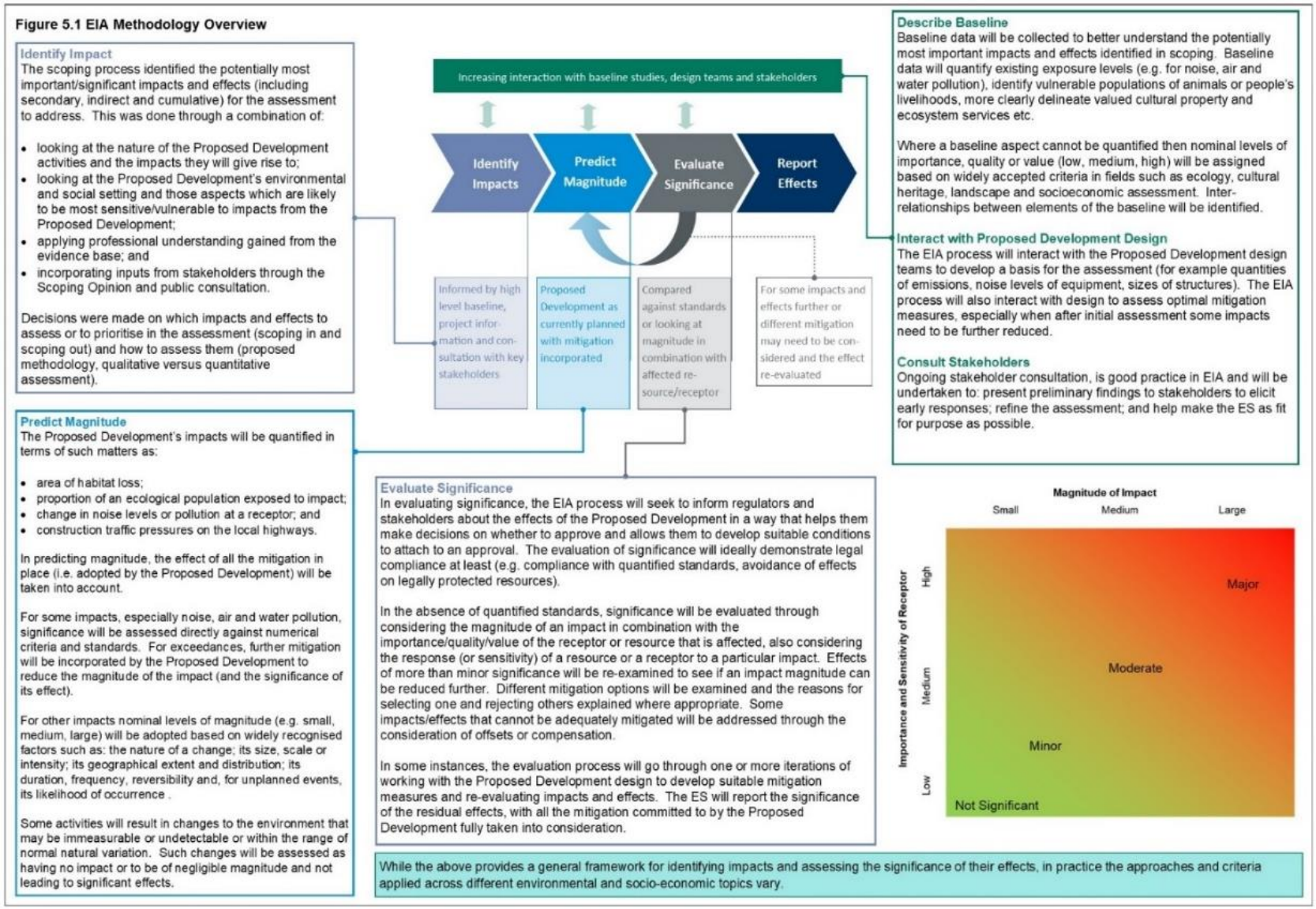
5.3.1.2 **Technical Appendices A-M** describe the data sources to be used and the baseline studies that will be undertaken for the EIA. The baseline studies will focus on those aspects of the baseline environment that could be affected by one or more of the material changes to the Proposed Development. The studies will also consider any changes from the originally considered baseline that are material to the assessment of effects of the Proposed Development.

5.4 IDENTIFICATION OF THE ASSESSMENT OF EFFECTS

5.4.1.1 'Impacts' are defined as the physical and chemical changes that are predicted to result from the Proposed Development and 'effects' are defined as the consequences of these impacts for ecological populations, ecosystems and people (including their physical and cultural assets).

5.4.1.2 **Figure 5.1** presents an overview of the approach used to assess the likely significant effects that may occur from the Proposed Development.

FIGURE 5.1 - EIA METHODOLOGY OVERVIEW



5.4.1.3 Whilst **Figure 5.1** provides a general framework for identifying impacts and assessing the significance of their effects, in practice the approaches and criteria applied across different environmental and socio-economic topics vary. The **Technical Appendices A-M** outline the proposed approaches to the technical topics that will be addressed in the EIA.

5.4.1.4 To the extent necessary all the technical topics will address the material changes noted in **Chapter 2, Proposed Development Description**. Topics will only undertake assessments where a change to the development may result in an impact that is materially different to that assessed in the Consented Development. Topics may also present updated assessments where there are significant changes in the baseline used to undertake the assessment presented in the Consented Development ES, or where there have been updates to the guidance and policy of topics which therefore require additional assessment not considered in the Consented Development ES. Topics will address the material changes associated with the construction, operation (including maintenance) and decommissioning phases of the Proposed Development. However, as decommissioning will be more than 40 years in the future it will not be addressed to the same level of detail as the other phases.

5.4.1.5 In accordance with Schedule 4 paragraph 5 of the 2017 EIA Regulations, the identification and assessment of effects for each topic will include an assessment of direct effects and any indirect, secondary, cumulative, short-term, medium-term, and long-term, permanent and temporary, positive and negative effects of the development, to the extent they are relevant.

5.5 MITIGATION

5.5.1.1 In assessing the significance of effects, full consideration has been given to the measures that will be used to mitigate impacts and minimise any potential adverse effects of the Proposed Development on the environment.

5.5.1.2 Schedule 4 (paragraph 7) of the EIA Regulations requires that where significant effects are identified, "A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment" should be included in the PEIR and ES.

5.5.1.3 One of the key objectives of an EIA is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures will be developed during the EIA process to avoid, minimise, reduce or remedy (e.g. reinstate or restore) any negative effects identified, and to create or enhance positive effects such as environmental and social benefits. Mitigation measures include design provisions and construction practices, as well as management actions. In some instances, mitigation alone may not

be sufficient to reduce an impact or effect to a level that is not significant, in which case other measures such as offsets (which can also deliver enhancement) are then considered. Although an offset may provide enhancement, enhancement in itself is different, typically adding something positive in accordance with local or national policy. Enhancement is not mitigation as such.

5.5.1.4 The mitigation measures developed during the EIA process, as well as standard industry practice measures, will be fully committed to by the Applicant as integral aspects of the Proposed Development.

5.5.1.5 Residual effects, once specific mitigation measures have been incorporated into the Proposed Development design (and into its construction and operational practices), will be classified as not significant or still significant (albeit reduced), as appropriate. Where effects are still significant, the mitigation options considered and the reasons for selecting particular measures will be reported in the PEIR and ES.

5.6 ENVIRONMENTAL MANAGEMENT

5.6.1.1 Whilst an outline Construction Environmental Management Plan (CEMP) has been prepared in relation to the Consented Development, this will now require an update to specifically cover the change from gas storage to hydrogen storage.

5.6.1.2 The CEMP introduces documents and the management plans that will be developed post-application into detailed documents, plans and procedures (in the form of a CEMP) as the Proposed Development progresses through later design processes.

5.6.1.3 In addition to the specific mitigation measures identified for each of the environmental topics, the Proposed Development's CEMP (or similar) will conform to general environmental management practices and health and safety considerations.

5.6.1.4 The outline CEMP for the Proposed Development will be submitted as an appendix to the PEIR and ES, which will set out the framework for effective management of safety, health, environmental and social impacts during the construction of the Proposed Development.

5.6.1.5 Post-application, a detailed CEMP and other construction best practice documents will be further developed, monitored and maintained by the Applicant's Engineering, Procurement and Construction (EPC) contractor.

5.6.1.6 It is no longer a legal requirement for applicants to produce a Site Waste Management Plan (SWMP). Nonetheless, it is acknowledged that the construction, operation, and demolition stages all have the potential to create waste. The Proposed Development will utilise good construction and management practices to ensure waste is minimised as far as possible and that the storage, transport and eventual disposal of waste have no significant environmental effects.

Management and collection of the waste streams will be carried out under the requirements of the UK waste regulatory regime.

5.7 ENGAGEMENT AND CONSULTATION

5.7.1.1 This section gives a summary of the engagement and consultation activities which will be undertaken by the Applicant to inform the EIA and to the iteration of the design of the Proposed Development. A detailed stakeholder mapping exercise was undertaken to identify key statutory and non-statutory stakeholders of the Proposed Development.

5.8 ENGAGEMENT UNDERTAKEN TO DATE

5.8.1.1 The Applicant has completed a series of early engagement activities with community members, local authorities, and statutory stakeholders. A summary of engagement undertaken to date is provided below in **Table 5.1**:

TABLE 5.1 - ENGAGEMENT COMPLETED TO DATE

Date	Stakeholder Group	Topic
22/01/2025	Planning Inspectorate	Introduction to the Material Change to the Consented Development for Hydrogen Storage
TBC	Secretary of State	Introduction to the Material Change to the Consented Development for Hydrogen Storage
20/02/2025	Cheshire West and Chester Council	Introduction to the Material Change to the Consented Development for Hydrogen Storage
06/03/2025	Department for Energy Security and Net Zero	Introduction to the Material Change to the Consented Development for Hydrogen Storage
07/04/24	Cheshire West and Chester Council	Statement of Engagement issued

5.8.2 STAKEHOLDER ENGAGEMENT PLAN

5.8.2.1 KGSL has prepared a Statement of Engagement (SoE) which sets out the proposed approach to consultation on the MC application for the KGSP. The SoE outlines how we plan to engage with stakeholders and the local community in a clear, transparent, and accessible way. KSLG

will share the SoE with Cheshire West and Chester Council (CWAC), as the host authority and the Local Liaison Group (LLG) ahead of launching the public consultation.

5.8.2.2 One stage of consultation will be undertaken in accordance with the approach set out in the SoE and in accordance with the relevant statutory requirements and guidance.

5.8.2.3 This includes engaging with statutory consultees, community stakeholders and residents within the consultation area. Our methods will include a newsletter mail-out to a 3.5 km area radius around the Proposed Development site at Holford Brinefield, a drop-in information event at Byley Village Hall, an online Q&A session, and a full set of consultation materials including the Preliminary Environmental Information Report (PEIR) available at the events and on the project website. Notices publicising the consultation will be placed in the Northwich, Winsford & Middlewich Guardian and The London Gazette, in line with regulatory requirements.

5.8.2.4 The purpose of this stage of public consultation is to provide key stakeholders and members of the public with information on the Proposed Development, and the key findings of this report. Stakeholders and the wider public will be able to provide their feedback via an online questionnaire freepost, email or in hard copy at in-person events, and on request.

5.8.2.5 An in-person event will take place during the Consultation period. This is an opportunity for local stakeholders to attend these open drop-in sessions to meet the Proposed Development team, ask any questions about the Proposed Development, and complete a feedback form.

5.8.2.6 The PEIR will capture the key responses from the S42 consultation with statutory consultees and the ES will clearly set out how all consultation on the Proposed Development (including the non-statutory and statutory consultation) has been addressed in its design, developing mitigation, and assessing effects.

5.8.2.7 Following the consultation period, KGSP will prepare a Statement of Consultation which will provide a detailed record of the feedback received and how this has been considered and responded to. This document will be submitted alongside the MC application and made publicly available, ensuring a transparent and accountable approach to community engagement.

5.9 SCOPE OF THE ASSESSMENT

5.9.1 GENERAL CONSIDERATIONS

5.9.1.1 The scope of the assessment is categorised into the following:

- technical scope;
- spatial scope; and
- temporal scope.

5.9.2 THE TECHNICAL SCOPE

5.9.2.1 **Chapter 6** and the **Technical Appendices A-M** specify the approach to be implemented for each technical topic (the 'technical scope') that comprise the EIA. In some cases, reference is made at the topic level to the spatial and temporal scopes, and these will be refined further as the EIA develops and will be described in the ES.

5.9.3 THE SPATIAL SCOPE

5.9.3.1 The spatial (or geographical) scope considers the following factors:

- the physical extent of the Proposed Development design;
- the nature of the baseline environment and the manner in which specific impacts are expected to be generated from their source; and
- the pattern of governmental administrative boundaries, which provide the planning and policy context for the Proposed Development.

5.9.3.2 For example, any potential effects on buried archaeology would tend to be confined to those areas physically disturbed by the works, whilst the effects of noise or visual intrusion could potentially be experienced at some distance from the works.

5.9.3.3 Applicable study areas will be proposed for each environmental topic by the experts undertaking that assessment, and in agreement with the relevant consultees.

5.9.4 THE TEMPORAL SCOPE

Overview

5.9.4.2 The temporal scope of the assessment typically refers to the time periods over which impacts may be encountered. This will be detailed for each topic, where necessary through discussion with the key statutory consultees.

5.9.4.3 Terms used to qualify the duration of an impact or effects will tend to be specific to the topic being considered.

Construction Phase

5.9.4.4 Construction phase impacts could possibly occur during the whole of the construction works, which are detailed further in **Section 2.4** of **Chapter 2, Proposed Development Description**.

5.9.4.5 Whilst the construction phase will not be continuous for 24 hours each day, there will be periods of high background noise activity and periods of more intensive traffic movements. The overall construction phase will be split into component activities allowing the durations of particular impacts and effects to be assessed and clearly reported.

5.9.4.6 The assessment will also consider the time of day during which works are likely to be undertaken, notably whether they will be undertaken during daytime or night-time periods.

5.9.4.7 The construction phase of the Proposed Development is expected to be 8 years.

Operation and Maintenance Phase

5.9.4.8 For the operational phase, the temporal scope will be established by the estimated date of the commencement of production, as outlined in **Chapter 2, Proposed Development Description** and thereafter, the anticipated operating lifetime of the Proposed Development.

5.9.4.9 The operational and maintenance phase is expected to be 40 years.

Decommissioning Phase

5.9.4.10 The Proposed Development will have an anticipated lifespan of 40 years and is not expected to result in any unusual environmental conditions as a result of, or following, decommissioning. Decommissioning activities are likely to start following the cessation of operations and are unlikely to take longer to complete than the construction phase.

5.10 APPLYING THE ROCHDALE ENVELOPE

5.10.1.1 The EIA will take account of all the reasonable variations in the form of the Proposed Development that should be permissible under the parameters and describe and assess the likely significant effects on the environment under a reasonable worst-case scenario. Such an approach is good practice, as reflected in case law on the 'Rochdale Envelope' principle (the Planning Inspectorate Advice Note Nine (July 2018; version 3)).

5.10.1.2 A balance has to be sought between defining the Proposed Development in enough detail to predict its impacts, whilst leaving sufficient flexibility to allow the Proposed Development to be successfully delivered . The Proposed Development design (or elements thereof) will be expressed as an 'envelope' for the purpose of assessing its impacts or possible range of impacts, including reasonable 'worst-case' impacts. To ensure that likely significant effects of the Proposed Development on the environment are appropriately described and assessed, parameters will be set which:

- are broad enough to encompass the potential variations in design and other aspects of the Proposed Development as it moves forward through later stages of design, after a material change to the DCO may have been granted; but
- provide sufficient detail to make an assessment of the effects and allow informed decisions on the application.

5.10.1.3 In order to follow this approach, the EIA will commence in parallel to a Pre-FEED process. Following pre-FEED (and the planning submission), further work will be completed on the FEED process itself, followed by detailed design and the development of construction working methods by an EPC contractor. The FEED and detailed design processes will be partially iterative with seeking an Environmental Permit to operate the Proposed Development. Aspects of the design could therefore also be influenced by post-application discussions with the EA and Health and Safety Executive (HSE). An element of flexibility is thus needed by the Proposed Development during pre-FEED (and FEED) to allow future changes to be contained with the parameters determined by the wording of the material change to the DCO.

5.11 CONSIDERATION OF THE MAIN ALTERNATIVES

5.11.1.1 Schedule 4 (paragraph 2) of the 2017 EIA Regulations requires developers to outline the main alternatives they have studied and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. The EIA will therefore consider the main alternatives and set out the main reasons for the Applicant's choice, considering the environmental effects and the Applicant's overall objectives for the Proposed Development.

5.11.1.2 The EIA will address alternatives, **Chapter 4, Alternatives**, including the selection of hydrogen, site location, equipment and technology. It will also include consideration of the Proposed Development's design or methods of construction or operation that will avoid, minimise, reduce, or remedy likely significant environmental effects. Where appropriate, the main reasons for selecting a particular alternative will be explained, taking into consideration technical and economic feasibility, as well as the environmental effects.

5.12 INDIRECT, SECONDARY AND CUMULATIVE IMPACTS AND INTER-RELATIONSHIPS BETWEEN IMPACTS

5.12.1 INDIRECT EFFECTS

5.12.1.1 There is no widely accepted definition of 'indirect' effects. Indirect effects (or induced effects) are taken to be effects that arise from the impact of activities not explicitly forming part of the Proposed Development and therefore not under the control of the Applicant.

5.12.1.2 Indirect effects may be the consequence of an action of the Proposed Development and occur much later in time or are much farther removed in distance, albeit still reasonably foreseeable. Indirect effects may also include (for example) the consequences of economic or population growth induced by a project and other effects related to induced changes in the pattern of land use, population growth rate, and related effects on air, water and soil and ecosystems in general.

5.12.2 SECONDARY IMPACTS AND EFFECTS

5.12.2.1 There is no widely accepted definition of 'indirect' effects, and the term is often used interchangeably with 'secondary' effects. For the purposes of the EIA, 'secondary' (and higher order) effects are taken to be part of a chain of impacts or effects that can be directly traced back to an action of the Proposed Development, mitigated by it and are assessed as an inherent part of this EIA by each specialist topic.

5.12.2.2 Secondary impacts and effects will be assessed integrally within the assessment.

5.12.3 CUMULATIVE EFFECTS

5.12.3.1 Both the EIA Directive and the 2017 EIA Regulations require an EIA to consider the potential for the Proposed Development to have cumulative effects on receptors. NPS EN-1 also refers to the consideration of cumulative effects in paragraph 4.2.5, stating that: *"The ES should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence)."*

5.12.3.2 Projects, plans and proposals with which the Proposed Development may have cumulative effects will be identified in consultation with the local planning authority and assessed accordingly.

5.12.3.3 Planning Inspectorate Advice on Cumulative effects assessment relevant to NSIPs goes on to emphasise the importance of considering cumulative effects in the context of the EIA Directive, the EIA Regulations and the Overarching Energy NPS EN-1.

5.12.3.4 The CEA proposed for the Proposed Development will adopt the four-stage approach set out in Advice Note 17 as follows:

- Stage 1: Establish the Proposed Development's Zone of Influence (ZoI) and identify a list of other developments within it;
- Stage 2: Identify a shortlist of other developments for CEA based on their potential to have similar effects to those of the Proposed Development on the same receptors;
- Stage 3: Information gathering; and
- Stage 4: CEA.

5.12.3.5 The CEA process is detailed in full in **Chapter 8, Cumulative Effects Assessment**.

5.13 DEALING WITH UNCERTAINTY

5.13.1.1 Even with a final Proposed Development description and an unchanging environment, predictions of impacts and their effects on resources and receptors can by definition be uncertain. Predictions can be made using varying means ranging from qualitative assessment and expert judgement (including reference to the evidence base) through to quantitative techniques (e.g. modelling).

The accuracy of predictions depends on the methods used and the quality of the input data for the Proposed Development and the environment. Where an assumption has been made, the nature of any uncertainty will be presented in the PEIR and ES.

5.13.1.2 Where uncertainty affects the assessment of effects, a conservative (i.e. reasonable worst case) approach to assessing the likely residual effects will be adopted with mitigation measures developed accordingly.

5.13.1.3 To verify predictions and to address areas of uncertainty, monitoring will be proposed as a key aspect of environmental management for the construction and operation of the Proposed Development.

6. LIKELY SIGNIFICANT EFFECTS AND PROPOSED SCOPE OF THE PEIR AND ES

6.1 INTRODUCTION

6.1.1.1 This chapter provides a summary of the likely significant effects of the Proposed Development on topics and therefore the proposed scope of the PEIR and ES. The MC PEIR and ES will include chapters on the topics outlined below. Full details of the scoping exercise undertaken by topics are provided in **Technical Appendices A-M**.

6.1.1.2 Effects scoped in for further assessment are limited to those which may change as a result of changes to the Proposed Development compared to the Consented Development, or were not assessed in the Consented Development, but now need to be assessed, due to changes to baseline, guidance, policy or legislation.

6.1.1.3 **Table 6.1** details new or different predicted environmental effects as a result of the Proposed Development.

TABLE 6.1 - CHANGE IN ENVIRONMENTAL EFFECTS AS A RESULT OF PROPOSED CHANGES TO THE DEVELOPMENT

ES Chapter Title	New or Different Likely Significant Environmental Effects
Geology and Ground Conditions	Review of the baseline environment in relation to geology and ground conditions shows that the baseline is materially unchanged since the Consented Development with a brief description provided in **Technical Appendix A, Geology and Ground Conditions**. The methodology for construction of the caverns will be as per the Consented Development and is therefore not expected to give rise to effects that would be materially different to those assessed in the ES for the Consented Development. Changes to the construction of the above ground work, including changes to the areas required for infrastructure, equipment and laydown, and changes to the configuration of below ground pipelines may lead to minor changes in the impacts to geology and ground conditions. Where the elements of geology and ground condition have not been assessed through the Consented Development, due to changes in policy and guidance, these will be considered in the assessment in the MC PEIR and ES. The loss of best

ES Chapter Title	New or Different Likely Significant Environmental Effects
	and most versatile (BMV) agricultural soils will be scoped into the MC PEIR and ES due to the change in construction areas from the Consented Development, with a baseline data review to include an agricultural land classification (ALC) survey. Potential sterilisation on mineral resources and the dewatering of excavations and trenches will also be assessed as these were not considered in the Consented Development ES. Mineral safeguard area mapping will be reviewed alongside developing design and assessment of potential effects of dewatering on groundwater flow, water quality and base flow of local watercourses and abstractions will also be undertaken.
Hydrology and Flood Risk	Review of the baseline environment shows that, since submission of the Consented Development ES, the only change to the baseline hydrology of the Study Area has been a change in the River Basin Management Plan (RBMP) status of the Puddinglake Brook from Moderate to Poor ecological status. Effects on surface water quality from the Proposed Development as a result of sedimentation, accidental spills and releases, and release of foul water are anticipated to result in Not Significant impacts assuming implementation of the appropriate mitigation measures in line with the conclusions of the Consented Development ES. These elements have thus been scoped out of further assessment. The main change introduced by the Proposed Development which is likely to affect hydrological resources is the extension of the GPP area. This could result in changes to the permeability of the Study Area and therefore the potential to alter water quantity and increase flood risk. In addition to this, a change to the Proposed Development to remove two onsite ponds, may result in sediment and contaminated water entering surface waterbodies and is therefore to be scoped in and assessed in the MC PEIR and ES. As per the conclusions of Chapter 7 of the Consented Development ES, with appropriate mitigation in place (as set out in **Technical**

ES Chapter Title	New or Different Likely Significant Environmental Effects
	Appendix B, Hydrology and Flood Risk, Section B.4) the impact on flood risk is expected to be Not Significant. However, due to the changes in the Proposed Development flood risk will be scoped into the MC PEIR and ES and a new Flood Risk Assessment produced.
Air Quality	The baseline Study Area for Air Quality has not materially changed from the Consented Development. It is also considered that the construction of the Proposed Development is unlikely to lead to new or different effects on Air Quality compared to the Consented Development, and that embedded mitigation will ensure that any dust impacts noted in the Consented Development ES will be negligible or minor. Traffic associated with construction and operation of the Proposed Development will be the same as the Consented Development and is therefore not considered further. During the operational phase of the Proposed Development venting or flaring may be required for routine maintenance, which will be a limited number of events, or for emergency situations. This will be developed further at the detailed design stage. Operational combustion emissions from venting or flaring have been scoped into the assessment in the MC PEIR and ES, and a single confirmed option will be assessed quantitatively using dispersion modelling with a study are of 10km.
Noise and Vibration	The baseline Study Area for Noise and Vibration has not materially changed from the Consented Development. The methods to construct the wellheads and below ground infrastructure of the Proposed Development will be the same as the methods set out in the consented Development. There are also no anticipated material changes to the expected construction road traffic flows. Therefore, potential noise and vibration from the construction and decommissioning of the wellheads and below ground infrastructure and road traffic are scoped out of the MC PEIR and ES.

ES Chapter Title	New or Different Likely Significant Environmental Effects
	As a result of amendments to the site infrastructure, as well as updates to the equipment to be used during construction, the plant teams and locations of construction activities will have changed since the Consented Development and therefore the effects may be different to those reported in the Consented Development ES. The amendments to the site infrastructure to be assessed and scoped into the PEIR and ES are: the size and location of the GPP (and associated equipment), the reduced infrastructure at SMC3 and the change in flowlines. Mitigation measures proposed in the Consented Development ES will be reviewed and amended as appropriate, and to be detailed in the commitments register to ensure no significant construction noise impacts to noise sensitive receptors. Due to the change in equipment required for the operation of a hydrogen facility (such as the operation of the GPP, change in location of substation and the potential for venting or flaring) there may be new of different noise effects from operation of the Proposed Development. Noise control and mitigation measures would be detailed in the MC PEIR and ES. Baseline noise monitoring for one week at noise sensitive receptors, in accordance with BS 4142, along with meteorological data such as rain and wind speed and direction will be used to inform modelling. The potential for significant noise effects during operation will be assessed according to BS 4142 and will be predicted using 3D computer noise modelling software (e.g., SoundPLAN) that implements the prediction method set out in ISO 9613.
Traffic and Transport	The baseline conditions for Traffic and Transport have not materially changed from the Consented Development. The most recent manual traffic count data (2023) available from the DfT's online traffic count database on the A530 King Street in the vicinity of the Site access increase indicates an average annual daily flow of 14,230 vehicles, which show minimal differences from previous manual counts (2000, 2003, 2005, 2007, 2008, 2010, 2019).

ES Chapter Title	New or Different Likely Significant Environmental Effects
	When compared to the Consented Development, it has been concluded that the revised application would result in the same total (or less) number of traffic movements through construction of the Proposed Development, with no change to the maximum daily number of movements during the peak period of construction anticipated. The Applicant is committed to maintain the agreed maximum daily traffic movements. In addition, there will be no changes to the operational traffic numbers of the Proposed Development from the Consented Development. Therefore, the assessed effect on routes is unchanged from the Consented Development ES. All traffic and transport effects will remain negligible and not significant and therefore it is proposed that the assessment of construction and operational phases of the Proposed Development are scoped out of the MC PEIR and ES.
Ecology and Nature Conservation	Ecological surveys are currently ongoing (started January 2025) at the Proposed Development Site and the completion of surveys is expected December 2025. These surveys will be used to confirm whether the changes considered in the MC application will lead to a new or different likely significant impact to ecological receptors. The assessment of impacts in the MC PEIR and ES will consider relevant effects upon European statutory designated sites within 10 km of the Scoping Boundary, should the qualifying features or conservation objectives of such sites have changed since the Consented Development. Impacts upon non-statutory sites within 2km of the Scoping Boundary that have been designated since the Consented Development will also be considered. All habitats onsite will be mapped and categorised under the UK Habitat Classification, with condition assessments carried out in order to calculate a measurable change in habitat units as a result of the Proposed Development. This will also serve to

ES Chapter Title	New or Different Likely Significant Environmental Effects
	identify areas of opportunity onsite for habitat enhancements. Based on existing survey data available, the following protected species will likely be considered within the initial scoping surveys, with further species-specific surveys to be carried out where new potential impacts are envisaged as a result of the MC application; • Bats; • Badgers; • Birds; • Great crested newts; • Riparian mammals; • Lesser silver water beetles; • Mud snails; and • Reptiles. Whilst the ecology surveys are being undertaken to review the baseline conditions for the Scoping Boundary since the Consented Development was prepared, the assessment of effects in the MC PEIR and ES will only focus on likely significant impacts to designated, non-designated sites and species types as a result of the material changes.
Landscape and Visual Impact	The baseline conditions for Landscape and Visual have not materially changed from the Consented Development. As a worst-case scenario, the Study Area of 2 km from the Scoping Boundary, as per the Consented Development, will be combined with a 3 km buffer from the boundary of the GPP due to the potential increased height of the vent or flare stack, and therefore increased visible range. This will be reviewed during the PEIR once a single option for venting or flaring has been confirmed. Visual receptors taken into consideration in the Consented Development remain relevant to this MC, which include residential receptors, Public Rights of Way (PRoW), users of nearby road and employment receptors. Representative viewpoints will be considered in the LVIA. Baseline photographic panoramas will be produced during Winter to represent the worst-case scenario for each viewpoint with minimal screening,

ES Chapter Title	New or Different Likely Significant Environmental Effects
	illustrating the nature of existing views in the direction of the Proposed Development in line with GLVIA3. During construction, activity associated with the above ground infrastructure (excluding the vent or flare stack), changes in configuration, construction or underground elements, and the reduced infrastructure at SMC3 are considered to not give rise to effects that would be materially different to those assessed in the ES for the Consented Development. However, activity associated with the construction of the vent or flare stack may lead to a new or different effect compared to the Consented Development given the potential increase in height, and therefore this element of construction activity is scoped into the MC PEIR and ES assessment. During operation, although potentially impacting landscape and views during operation and maintenance, elements of the Proposed Development, (including changes to configuration of lower level infrastructure, changes to the location of HV infrastructure, changes to underground elements and reduced infrastructure at SMC3) are not anticipated to give rise to effects that would be materially different to those assessed in the ES for the Consented Development. However, the presence of the increased height of the vent or flare stack, and the potential for visible flaring, may give rise to landscape and visual effects, that will be materially different to those outlined in the Consented Development ES, and this element of operation is therefore proposed to be scoped into the MC PEIR and ES assessment. A single option for venting or flaring will be assessed in the MC PEIR and ES.
Cultural Heritage	The baseline conditions for cultural heritage have not materially changed from the Consented Development. As a result of updates to guidance and best practise, geophysical surveys, which were not undertaken for the Consented Development ES, will be undertaken to inform the baseline for the MC PEIR and ES and a full description of the baseline will be given in both. Results of the desk-based assessment for cultural heritage baseline and the

ES Chapter Title	New or Different Likely Significant Environmental Effects
	geophysical surveys will be discussed with Cheshire Archaeology Planning Advisory Service (CAPAS) and a decision taken as to whether further baseline surveys, that may include intrusive investigations, are required. Elements of the Proposed Development which will be scoped into the MC PEIR and ES assessment are: ground disturbance during construction phase causing potential loss of whole or part of a buried archaeological site; and impacts during construction, operation and decommissioning phases on the setting of heritage sites and landscapes. These are due to the changes in size and location of above ground infrastructure and changes to the potential below ground works associated with the rationalisation of pipework. Key sensitivities include the potential for currently unknown buried archaeology to be present within the Scoping Boundary at Drakelow Hall and King Street.
Socio-economic Characteristic	The Study Area for the baseline for socio-economic characteristics comprises the ward of Shakerley, as this is where any direct impacts will occur, and the local authority of CWAC, as this is the level at which employment and supply chain effects will be assessed. The Consented Development baseline used data from the 2011 Census, the 2013 Annual Population Survey (APS), and the 2010 Indices of Multiple Deprivation (IMD). This will therefore be updated to data from the 2021 Census, Annual Population Survey (APS) 2024, Business Register and Employment Survey (BRES) 2024 and English IMD n2019. Since the Consented Development, there have been developments in best practice and new guidance on the impacts on socio-economic characteristics to be considered in EIA from the Overarching National Policy Statement (NPS) for Energy (EN-1) (2024). Therefore, a number of elements of the Proposed Development are scoped into the MC PEIR and ES as they were not considered in the Consented Development ES. These are: Gross Value Added (GVA) effects; skills and training opportunities; and wider socio-economic effects. In addition to these, it

ES Chapter Title	New or Different Likely Significant Environmental Effects
	is proposed that employment and supply chain effects are scoped into the assessment to provide a more detailed assessment of direct, indirect and induced employment within the Study Area, in line with current industry best practice. While direct impacts on PRoW are not expected to be materially different from those assessed in the Consented Development ES, in-combination effects on amenity could be materially different due to the presence of a vent stack and potential visible flaring of gas. Effects on PRoW are therefore proposed to be scoped in for further assessment.
Population and Human Health	The ES for the Consented Development was undertaken prior to the amendments to the EIA Directive (2014/52/EU) and the publication of the 2017 EIA Regulations which brought human health into the EIA process, and therefore did not include a population and human health chapter. However, some aspects such as demographics and amenity were considered as part of the socio-economics assessment. The basis for the assessment for population and human health will therefore be all activities associated with the construction of the Proposed Development. The potential for effects to arise from pre-construction activity is also considered within this chapter, in line with established best practice for human health assessment. In addition, all activities associated with the operation and maintenance of the Proposed Development will be included in the MC PEIR and ES. The following determinants of health are proposed to be scoped in for further assessment: physical activity; open space, play and leisure; transport modes, access and connections; community safety; education and training; employment and income; climate change adaptation and mitigation; air quality; and noise and vibration.
Major Accidents and Disasters	While safety considerations were assessed as part of the Consented Development applications, there was no standalone Major Accidents and Disasters

ES Chapter Title	New or Different Likely Significant Environmental Effects
	(MA&D) chapter. Changes to national policy and guidance since the submission of the Consented Development now recommend this topic is included in the ES in the form of a standalone chapter. As MA&D is a new standalone chapter in the MC PEIR and ES there is no direct comparison between the assessment of the Consented Development and the Proposed Development. The basis for assessment uses the updated guidance for MA&D and considers the material changes of the Proposed Development. Hazard Identification studies will be carried out during the early design stage for all aspects of the Proposed Development where there is potential for a major accident to people or to the environment. The objective of these studies will be to identify major accident hazards, assess risk levels and define preventative and mitigative control measures. The studies will cover the construction and drilling phases to the extent necessary but will focus on operation of the Proposed Development. Further detailed hazard and risk assessment studies will be required and undertaken at later design stages. The following elements are proposed to be scoped into the MC PEIR and ES assessment: • loss of containment of hazardous substances such as hydrogen leading to fire / explosion; • domino effects to / from adjacent industrial sites; • drilling hazards; • lightning; and • security.
Waste	Whilst waste was considered in the Consented Development applications, there was no standalone ES chapter for this topic. Changes to national policy (such as NPS EN-1 and the Waste Management Plan for England 2021) and guidance (Institute of Environmental Management and Assessment (IEMA) Guide to Material and Waste in EIA, 2020) since the submission of the Consented Development now recommend waste is included in Environmental Statements in the form of a standalone chapter.

ES Chapter Title	New or Different Likely Significant Environmental Effects
	Therefore, a waste chapter will be included in the MC PEIR and ES. The majority of construction wastes are likely to be as surplus site preparation and excavation material. Other construction waste types will be generated in smaller quantities. The changes to the Proposed Development from the Consented Development are not anticipated to materially impact the nature and volume of waste generated during construction. The disposal route of brine will not change and will be discharged as per the Consented Development. Minor changes to the volume of waste produced during the construction of above ground infrastructure may be anticipated due to the removal of the NTS, change to SM3 and increase in size of the GPP, however, this is not considered to change the impact from waste compared to the Consented Development and mitigation remains the same. Where the elements of waste surplus have not been assessed through the Consented Development, such as the burden of regional capacity on landfill sites, these will be considered in the waste assessment in the MC PEIR and ES. Wastes arising during operation will be significantly less in volume than those during construction but may include materials that require specialist treatment and disposal. It is considered that changes associated with operation of the Proposed Development are not anticipated to give rise to effects that would be materially different to those described in the ES for the Consented Development. Where the elements of waste surplus have not been assessed through the Consented Development, these will be considered in the waste assessment in the MC PEIR and ES. As such, the waste chapter of the MC PEIR and ES proposes to assess effects of waste generation of the Proposed Development on landfill capacity, in line with current guidance, as this was not considered as part of the Consented Development ES. Elements included are the handling and disposal of excess soils, construction wastes and operational

ES Chapter Title	New or Different Likely Significant Environmental Effects
	wastes, placing a burden on regional landfill capacity.
Climate Change and Greenhouse Gas Emissions	Since the Consented Development, the 2017 EIA Regulations have been published which require the inclusion of an assessment of the vulnerability of the Proposed Development to climate change where likely significant effects could arise. The climate assessment will include: understanding baseline conditions of the Proposed Development; identifying climate hazards; consideration of the impact future warming scenarios; identification of any 'at risk' assets; and the consideration of adaptation, resilience and/or mitigation measures pertinent to the relevant hazards. The wider determinants of climate change to be scoped into the MC PEIR and ES assessment are: • Temperature-related climate hazards - changing temperature; heat stress; temperature variability; heat/ cold waves and frost; wildfires; • Water-related climate hazards - changing precipitation patterns and types (i.e. rain, hail, snow and ice); precipitation or hydrological variability; water stress; drought; heavy precipitation; floods; and • Wind-related climate hazards - changing wind patterns and storms. The MC PEIR and ES will therefore assess the impact of climate change on the Proposed Development and understand the suitable adaptation measures required to ensure the Proposed Development is resilient to future climate change. Since the Consented Development was submitted, the 2017 EIA Regulations also require the inclusion of a Greenhouse Gas (GHG) assessment as part of the EIA Regulations. GHG emissions will be considered throughout the construction, operation and decommissioning stages of the Proposed Development. The GHG emissions will be classified in accordance with best practice GHG reporting into the following categories: scope 1 emissions (direct); scoped 2 emissions (indirect);

ES Chapter Title	New or Different Likely Significant Environmental Effects
	and scope 3 emissions (indirect). The GHG assessment will report the GHG emissions in tonnes of carbon dioxide equivalent (tCO2e). Downstream effects of the use of hydrogen will not be considered in the assessment as the Proposed Development is for the storage of hydrogen only, not the production. The GHG assessment will consider the level of significance of the GHG emissions and understand the opportunities for them to be reduced with suitable mitigations. The MC PEIR and ES will present the GHG assessment for the Proposed Development and describe the suitable mitigations to reduce the impact of the Proposed Development on climate change.

7. MITIGATION AND COMMITMENTS REGISTER APPROACH

7.1 INTRODUCTION

7.1.1.1 One of the key objectives of an Environmental Impact Assessment (EIA) is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures which serve to reduce the effects of the Proposed Development. Mitigation measures will be developed during the EIA process to avoid, minimise, reduce or remedy any negative effects identified, and to create or enhance positive effects such as environmental and social benefits. Mitigation measures include design provisions and construction practices, as well as management actions and will be identified in the EIA topic chapters in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

7.1.1.2 There also need for clear mechanisms for fully incorporating measures into the Proposed Development as it moves through its various phases of detailed design, preconstruction, construction, operation and maintenance, and decommissioning.

7.1.1.3 In order to demonstrate that all necessary controls and mitigation measures have been identified and there is a mechanism to secure them, a tabulated summary of mitigation measures for the Proposed Development will be prepared. This will be the "Commitments Register". The register will set out the measures required to ensure that potential environmental effects arising from the project are mitigated as far as possible and in accordance with the mitigation hierarchy.

7.1.1.4 Commitments can include:

- measures designed into the project to minimise adverse effects or to provide beneficial outcomes in order to secure good design;
- measures that are part of good construction practice or that would have to be applied to meet a regulation or standard;
- measures developed in the course of the assessment process to mitigate impacts that stem from particular elements of the project and/or its environmental and socioeconomic setting; and
- monitoring.

7.1.1.5 The purpose of a Commitments Register is to track commitments made by the Applicant throughout the planning process, including post decision detailed design, procurement, construction, operation and decommissioning. The Commitments Register will remain 'live' beyond the approval stage.

7.1.1.6 The contents of the register will be agreed with relevant stakeholders.

7.1.1.7 An example of a Commitment Register template which may be used for the Proposed Development is provided in Table 7.1.

TABLE 7.1 - PROPOSED APPROACH TO THE COMMITMENT REGISTER

Commitment Reference	Commitment	Monitoring	Project Phase	Relevant Aspect	Related Aspects	Commitment Securing Mechanism	Delivery	Associated Supporting Documentation	Compliance Date and Details
Unique reference number	Commitment text, as quoted in the DCO and/or relevant supporting document	Monitoring text, as quoted in the DCO and/or relevant supporting document	Procurement, pre-construction/ site clearance and preparation/ Construction/ Operation/ Decommissioning This is the phase or phases to which the commitment applies	The primary environmental aspect to which the commitment relates This is the aspect (as represented by an EIA topic) to which the mitigation measure or commitment primarily applies	Other EIA aspects that will benefit from this commitment. This is the other aspects (as represented by an EIA topic) that will benefit from the measure	Requirement and/or Schedule reference and title. This is the draft DCO requirement that secures the commitment along with securing mechanisms (e.g. CEMP) stipulated in that requirement plus the regulator(s) involved in approving the securing mechanism.	e.g. Pre-commencement of relevant construction/ connection/ licenced activity works. This is the stage in the project life when the securing mechanism must be delivered, e.g the CEMP signed off by the council.	Identify relevant paragraph/section, document and document reference.	Set out date on which compliance was achieved. This is for the project implementation phase and will remain empty until after approval stage.

8. CUMULATIVE EFFECTS ASSESSMENT

8.1 INTRODUCTION

8.1.1.1 This chapter presents the proposed methodology to the assessment of the potential cumulative effects of the Proposed Development.

8.1.1.2 For the ES for the Consented Development, no standalone chapter for a Cumulative Effects Assessment (CEA) was produced and cumulative effects were assessed in each individual environmental topic chapter.

8.1.1.3 Whilst a brief description of the methodology to assess cumulative effects was considered in Section 6.5 of the ES for the Consented Development, changes to policy and guidance since this submission (namely the 2017 Regulations) now require cumulative effects to be assessed in greater detail. Therefore, this chapter will outline the changes in methodology to consider potential cumulative effects for the Proposed Development.

8.1.1.4 Cumulative effects are defined by the European Commission (Walker and Johnston, 1999) as "Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

8.1.1.5 Cumulative effects occur when the Proposed Development is considered together with effects from other planned projects or developments on the same single resource or receptor.

8.2 POLICY AND LEGISLATION

8.2.1.1 Schedule 4 paragraph 5 of the Infrastructure EIA Regulations 2017 sets out the information that should be included in an ES and includes: *"A description of the likely significant effects of the development on the environment resulting from, inter alia: (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".*

8.2.1.2 In addition, the requirement to include cumulative effects in planning and decision making is described in the 2024 National Planning Policy Framework[19] with references to the cumulative impacts on landscape and visual, flood risk, pollution and effects of human health, and air quality amongst other topics.

8.2.1.3 The need to consider cumulative effects in planning and decision making is also set out in planning policy, in particular the NPSs with the Overarching NPS for Energy (EN-1) stating in paragraph 5.16.7 that *"The ES should in particular describe: …any cumulative impacts".*

[19] National Planning Policy Framework, 2023, Ministry of Housing, Communities and Local Government. Available online at: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf

8.3 PROPOSED METHODOLOGY OVERVIEW

8.3.1.1 The standard CEA methodology for the EIA will apply the approach from the Planning Inspectorate Advice Note 17, Cumulative Effects Assessment (August 2019). This includes the four stages below to assess cumulative effects:

- Stage 1: identify the zone of influence and establish a long list of 'other existing development and/or approved development';
- Stage 2: identify a shortlist of 'other existing development and/or approved development' for the CEA;
- Stage 3: information gathering as required; and
- Stage 4: assessment.

8.3.1.2 Sections 8.4 - 8.6 describe each of the stages above and how they will be applied to assess the cumulative effects for the Proposed Development.

8.4 STAGE 1 (ESTABLISHING A LONG LIST OF 'OTHER EXISTING DEVELOPMENT AND/OR APPROVED DEVELOPMENT')

8.4.1.1 The assessment shall utilise a proportionate approach to determine any other developments that could contribute to impacts on the same receptors as the Proposed Development. The typical principles to apply the proportionate approach will be as follows.

- All Nationally Significant Infrastructure Projects (NSIP's) and Transport and Works Act applications will be included for consideration.
- With increasing distance from the Proposed Development, the CEA will progressively screen out other types of applications based mainly on their scale (as explained below).

8.4.1.2 Since the Consented Development was approved, there are a number of new cumulative developments which will be included in the long list for assessment in the PEIR and ES which are part of the HyNet north-west cluster (including the Cadent HyNet Hydrogen Pipeline DCO project which is currently being progressed).

8.4.1.3 The Proposed Development is not anticipated to have any substantive pollutant emissions to air (see **Chapter 8, Air Quality**). Consequently, the search area will be determined by the largest distance at which the Proposed Development could potentially have impacts, for example up to a defined radius around the Scoping Boundary for Ecology, which for the purpose of this Scoping Report is taken to be 2 km.

8.4.2 SCALE OF OTHER DEVELOPMENTS

8.4.2.1 **Table 8.1** sets out the proposed scale and spatial parameters to be used to identify the long list of other developments for the CEA for terrestrial projects.

TABLE 8.1 - PLANNING CATEGORIES SCALE AND SPATIAL SCOPES

Category (Note 1)	Spatial Scope
Nationally Significant Infrastructure Project: Terrestrial Project Applications	5 km from the onshore components of the Proposed Development.
Section 36 (including variations) and 37 of the Electricity Act Applications	5 km from the onshore components of the Proposed Development.
Transport Works Act Application: Terrestrial Project Applications	5 km from the onshore components of the Proposed Development.
Town and Country Planning Act 1990 (TCPA): consented developments that required an EIA under the EIA Regulations; applications that have been screened in for EIA; applications that have submitted an EIA screening request; applications that required a HRA, at least to screening stage, under the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations); and other applications and consented development included at the discretion of the local planning authority.	5 km from the onshore components of the Proposed Development.

8.4.2.2 For development which comes under the Town and Country Planning Act 1990, the CEA will predominantly consider consented development, development where a consent decision is pending, and pending applications (e.g. for which a screening opinion has been requested).

8.5 STAGE 2 (CREATING A SHORTLIST OF 'OTHER EXISTING DEVELOPMENT AND / OR APPROVED DEVELOPMENT

8.5.1 TEMPORAL CONSIDERATIONS

8.5.1.1 The status of other development in terms of whether its construction could overlap in time with the Proposed Development construction phase is relevant in regard to the potential for cumulative construction-related impacts.

8.5.1.2 Where a construction period is likely to overlap between the Proposed Development and another cumulative development, those other cumulative developments will be screened as 'possibly cumulative during construction' and the CEA will assess cumulative construction impacts. The other developments to be considered will be limited to a five-year period preceding the date of submission of the ES since planning permissions typically expire after a period of three to five years.

8.5.1.3 Using a worst-case approach, the CEA will assume there will be overlapping operational phases for all the other developments with the operational phase of the Proposed Development, even though it is possible that some of these other developments may not proceed.

8.5.2 TECHNICAL CONSIDERATIONS

8.5.2.1 Not all the impacts of the Proposed Development could lead to cumulative effects with impacts from other developments. Also, for the Proposed Development to have cumulative impacts on the same receptor as other developments, the receptor would need to be within a Zone of Influence (ZOI) for the impact concerned.

8.5.2.2 The environmental topics, impacts and zones of influence will be assessed and where they are identified as having the potential to contribute to cumulative impacts on receptors within the zones of influence for the type of impact under consideration they will be included in the CEA. The ZoI takes into consideration the areas / receptors likely to be affected by the Proposed Development activities and facilities that are directly owned, operated, or managed (including by contractors) and that are a component part of the Proposed Development.

8.5.2.3 The zones of influence are defined by each environmental topic and vary based on the assessment criteria of each topic.

8.5.2.4 The possible cumulative effects of major accidents and disasters will be fundamentally studied within that topic. Such potential effects are typically directed by other legislation enforced by the HSE.

8.5.2.5 The other developments identified and shortlisted at Stages 1 and 2 of the CEA will be presented in the PEIR (and ES), with details of their current status. Other developments will be gradually screened out or in from the long list based firstly on temporal considerations and secondly on technical considerations (as explained above). Some other developments may also be immediately screened out by virtue of their very small scale and very low potential to have cumulative effects with the Proposed Development.

8.6 CEA STAGES 3 AND 4

8.6.1.1 Based on the outcome of Stages 1 and 2 of the CEA a number of other developments will be taken forward for further consideration in Stages 3 and 4 of the CEA. The number of other developments considered in

each topic is likely to vary depending on the size of the topic ZOIs and the likely nature of the impacts from the other developments (for example, a large housing development being constructed could be considered to have potential cumulative noise effects with the Proposed Development's construction, but to have no likely significant cumulative noise effects during operation of the housing development).

8.6.1.2 To the extent necessary, further information on the short-listed developments will be collected and considered in making the EIA topic assessments. Each topic will apply its standard assessment criteria in undertaking the CEA and the mitigation measures already committed to by the Proposed Development will be inherently considered. In considering the likely effects of other developments the CEA will assume that they would all be required to meet regulatory requirements and a standard of good industry practice. Each topic will also consider whether the cumulative effect of the Proposed Development plus other development would lead to a different (i.e. greater) level of significance than that for the Proposed Development alone.

APPENDIX A GEOLOGY AND GROUND CONDITIONS

A. GEOLOGY AND GROUND CONDITIONS

A.1. INTRODUCTION

A.1.1.1. This chapter identifies the geology and ground conditions of relevance to the Proposed Development and considers the potential effects from construction, operation, maintenance, and decommissioning activities.

A.1.1.2. This section sets out the approach and scope of the Geology and Ground Conditions impact assessment which will consider potential effects of the Proposed Development on:

- Soil, including agricultural soil resources;
- Geological features, including geological Sites of Special Scientific Interest (SSSI) and Regionally Important Geological and Geomorphological Sites (RIGGS));
- Mineral resources;
- Human Health receptors (e.g., exposure to contamination) and
- Groundwater, including abstractions.

A.2. TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

A.2.1.1. Key items of policy and legislation specifically relevant to geology and ground conditions in the context of the Proposed Development are as follows:

- The Environmental Protection Act 1990[1];
- Groundwater (England and Wales) Regulations 2009[2];
- Water Resources Act 1991 (as amended by the Water Act 2003)[3];
- National Planning Policy Framework[4];
- National Policy Statements (including NPS for Overarching Energy (EN-1)[5] and NPS for Oil and Gas Supply and Storage (EN-4)[6];
- Cheshire West and Chester Council (CWAC) Local Plan[7];
- Cheshire Replacement Minerals Local Plan[8];

[1] Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents.
[2] Groundwater (England and Wales) Regulations, 2009. Available at: https://www.legislation.gov.uk/ukdsi/2009/9780111480816
[3] Water Resources Act 1991. Available at: https://www.legislation.gov.uk/ukpga/1991/57/contents.
[4] Ministry of Housing, Communities & Local Government, *National Planning Policy Framework (NPPF)*, 2012 (revised 2023). Available at: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf
[5] Overarching National Policy Statement for Energy (EN-1), January 2024. Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1
[6] National Policy Statement for Electricity Networks Infrastructure (EN-5), January 2024. Available at: https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4
[7] Cheshire West and Chester Local Plan Part 1 (adopted 2015) and Part 2 (adopted 2019). Available at: https://consult.cheshirewestandchester.gov.uk/kse/folder/59487
[8] Cheshire Replacement Minerals Local Plan, 1999. Available at: https://www.cheshireeast.gov.uk/pdf/planning/spatial-planning/strategic-planning/en-ldf-crepmlp-99.pdf

- Land Contamination Risk Management (LCRM) 2020[9]; and
- New Perspective on Land and Soil in Environmental Impact Assessment, 2022[10].

A.3. BASELINE ENVIRONMENT

A.3.1. STUDY AREA

A.3.1.1. The Scoping Boundary for the Proposed Development covers a total area of 454 hectares (ha), as shown on **Figure 2.1.** For the purpose of the Geology and Ground Conditions chapter, the Study Area comprises the land contained within the Scoping Boundary (i.e. the 'Site') plus a 500 m buffer zone. The Study Area for this topic is shown on **Figure A.1, Geology and Ground Conditions Study Area.**

A.3.2. DATA SOURCES - SCOPING

A.3.2.1. The following sections in this chapter of the Scoping Report are based on a preliminary review of the following data sources:

- National Soil Resources Institute 'Soilscapes' online map viewer (accessed February 2025)[11];
- Natural England Agricultural Land Classification (ALC) online mapping (accessed February 2025)[12];
- British Geological Survey (BGS) 'GeoIndex Onshore' interactive map viewer (accessed February 2025)[13];
- Mining Remediation Authority online map viewer (accessed February 2025)[14]
- Department for Environment, Food and Rural Affairs (Defra) 'Magic' online mapping (accessed February 2025)[15];
- CWAC Local Plan (Part 2), and associated Minerals Safeguarding Guidance Note[16];
- EA Catchment Data Explorer (accessed February 2025)[17];

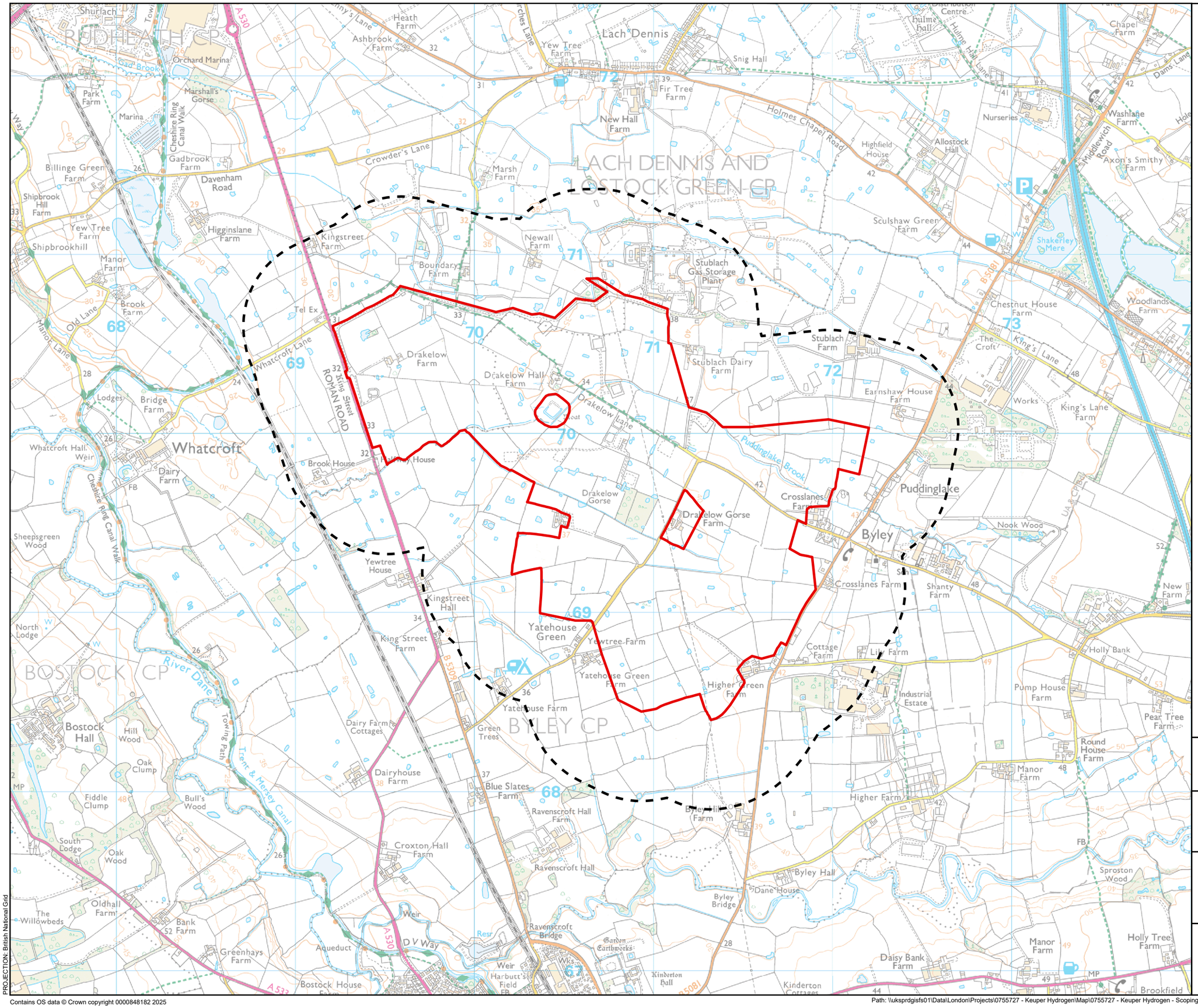
[9] Environment Agency / Department for Environment, Food and Rural Affairs, *Land Contamination Risk Management (LCRM)*, October 2020 (last revised July 2023). Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
[10] Institute of Environmental Management & Assessment, *A New Perspective on Land and Soil in Environmental Impact Assessment*, 2022. Available at: https://www.iema.net/resources/blog/2022/02/17/launch-of-new-eia-guidance-on-land-and-soils
[11] National Soil Resources Institute 'Soilscapes' online map viewer: https://www.landis.org.uk/soilscapes/
[12] Natural England, Agricultural Land Classification online mapping: https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::provisional-agricultural-land-classification-alc-england/explore?location=52.702412%2C-2.141583%2C6.98
[13] British Geological Survey 'GeoIndex' online mapping: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/
[14] Mining Remediation Authority online map viewer: https://datamine-cauk.hub.arcgis.com/
[15] Department for Environment, Food and Rural Affairs (Defra) 'Magic' online mapping: https://magic.defra.gov.uk/magicmap.aspx
[16] Cheshire West and Chester Council Minerals Safeguarding Guidance Note (undated). Available at: https://cheshirewestandchester.objective.co.uk/portal/dm/guidance_forms/min_safe_gn
[17] Environment Agency 'Catchment Data Explorer'. Available at: https://environment.data.gov.uk/catchment-planning

- EA Water Resources: Help for License Trading online mapping (accessed February 2025)[18]; and
- Keuper Gas Storage Project (KGSP) Environmental Statement (November 2015)[19].

A.3.2.2. The Environmental Statement (ES) will present more detailed information on the baseline geology and ground conditions, including site-specific data obtained from an environmental database (i.e. Landmark Envirocheck® Report, or similar) and data held by the applicant/landowners.

[18] Environment Agency 'Water Resources: Help for Licence Trading' online mapping: https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=db8e98d0845e461393855f9a3ddba2eb

[19] Keuper Gas Storage Project Environmental Statement, November 2015. Prepared by Environmental Resources Management Limited.



Scoping Boundary

Scoping Boundary 500 m Buffer

0 200 400 600 800 1,000

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED:
DATE: 21/03/2025	APPROVED:

Figure A.1
Geology and Soils Study Area
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - Geology and Soils Study Area - A01

A.3.3. DESCRIPTION

A.3.3.1. The baseline environment for the Geology and Ground Conditions assessment has not materially changed since submission of the Consented Development. A brief overview is provided below. Further details of the baseline environment in relation to this topic are provided in Section 7.3 of the Consented Development ES[19].

A.3.3.2. The soil underlying the Site is ALC Grade 3a and 3b[12,19], falling within the definition of 'Best and Most Versatile' (BMV) agricultural soils.

A.3.3.3. The geology underlying the Site comprises superficial deposits of Glacial Till, with glaciofluvial sands and gravels in the far east, underlain by bedrock of the Sidmouth Mudstone Formation[13,19]. There are no geological SSSIs[15] or RIGGS, as defined in the Local Plan[20], located within the Study Area.

A.3.3.4. The glaciofluvial sand and gravel deposits at the far east of the Site and within the Study Area to the east are designated as a minerals safeguarding area and potential future working area for sand and gravel under the Local Plan[21]. The southern part of the Site is designated as a preferred are for salt and brine working (controlled brine extraction). The eastern part of the Site is located within the area covered by Petroleum Exploration and Development Licence PEDL296, Block SJ77.

A.3.3.5. Aquifer classifications[15] are as follows:

- Glacial Till: Secondary Undifferentiated Aquifer;
- Glaciofluvial sands and gravels: Secondary A Aquifer; and
- Sidmouth Mudstone: Secondary B Aquifer.

A.3.3.6. Based on available BGS borehole records, depth to groundwater is anticipated to be between approximately 2.5m – 3.5m bgl. Groundwater vulnerability beneath the Site is classified as low to medium[15].The EA has classified the underlying Weaver and Dane Quaternary Sand and Gravel Aquifer groundwater body as having overall 'Poor' status[17]. No Source Protection Zones (SPZ) or Drinking Water Safeguard Zones for groundwater are located within the Study Area.

A.3.3.7. Based on available online EA mapping[18], no licensed groundwater abstractions are recorded within the Study Area. This will be confirmed for the PEIR and ES on receipt of further baseline data in the form of an environmental database search and consultation with CWAC and the EA.

[20] Cheshire West and Chester Local Plan Part 1 (adopted 2015) and Part 2 (adopted 2019). Available at: https://consult.cheshirewestandchester.gov.uk/kse/folder/59487
[21] Cheshire West and Chester Local Plan Part 1 (adopted 2015) and Part 2 (adopted 2019). Available at: https://consult.cheshirewestandchester.gov.uk/kse/folder/59487

A.3.4. KEY SENSITIVITIES

A.3.4.1. Key sensitivities (receptors) in the context of geology and ground conditions which will be considered in the assessment, include:

- BMV agricultural soil;
- Mineral resources;
- Secondary aquifers underlying the Proposed Development; and
- Human health (onsite and offsite construction workers / operational phase workers / occupants of residential properties).

A.4. BASIS OF ASSESSMENT

A.4.1.1. During construction, the following aspects of the Proposed Development may give rise to geology and ground condition impacts, that will be materially different to those outlined in the ES for the Consented Development:

- Construction activity of the lower height infrastructure and use of hydrogen equipment, associated with the change in configuration / location of the surface layout and design, including the Gas Processing Plant (GPP), the Hydrogen Above Ground Infrastructure (HAGI), utility package plants, electrical substation, venting / flaring technology and internal roads;
- Changes to the configuration of the temporary construction elements, including temporary laydown area, and construction cabins;
- Construction activity associated with the underground elements of the Proposed Development, including the digging of trenches associated with changes to the configuration of the pipelines; and
- Changes to elements of the Solution Mining Compound (named 'SMC3' in the Consented Development).

A.4.1.2. The methodology for construction of the caverns will be as per the Consented Development.

A.4.1.3. Where the elements of geology and ground condition have not been assessed through the Consented Development, due to changes in policy and guidance, these will be considered in the assessment in the MC ES.

A.4.1.4. The basis for the assessment also includes embedded mitigation where appropriate, which will influence the magnitude and / or the likelihood of an impact.

A.5. MITIGATION

A.5.1.1. Mitigation measures will be presented to avoid, minimise or reduce adverse impacts. The requirement for additional measures will be dependent on the significance of the effects on ground conditions and land quality and will be consulted upon with statutory organisations during the EIA process.

A.5.1.2. Based on the assessment of the baseline and the identification of any potential impacts, the ES will make clear commitments to the mitigation measures to be employed during construction and operation of the Proposed Development. It is anticipated that the majority of mitigation in relation to this topic will be secured via implantation of a Construction Environmental Management Plan (CEMP). An outline CEMP will be included in the ES.

A.6. LIKELY SIGNIFICANT EFFECTS - EIA

A.6.1.1. Due to the nature of the Proposed Development, the potential for likely significant effects on geology and ground conditions is primarily limited to the construction phase.

A.6.1.2. The table below lists the likely significant effects relevant to geology and ground conditions. Elements which are no different to the Consented Development are proposed to be scoped out. Justification for other elements proposed to be scoped out is described in the following section.

TABLE A.1 LIKELY SIGNIFICANT EFFECTS FOR GEOLOGY AND GROUND CONDITIONS

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Loss of BMV agricultural soils *(construction phase)*	Permanent loss of agricultural soils will be kept to a minimum.	Assessed as 'Not Significant' for the Consented Development.	Scoped In due to extension in the GPP area for the Proposed Development	Change (increase) in construction areas compared to the Consented Development. Baseline data review to include review of ALC survey to identify locations and characteristics of BMV soils.
Temporary changes to soil function (e.g. by compaction, infiltration) *(construction phase)*	Post-construction, working areas will be reinstated to pre-existing condition as far as reasonably practical in line with DEFRA 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites PB13298. Soil Management Plan to		Scoped Out	N/A No change from consented Development.

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	be developed as part of the CEMP.			
Sterilisation of mineral resources *(construction phase)*	Embedded mitigation – mineral safeguard zones and designated geological sites will be avoided by the permanent footprint	Not significant – designated mineral safeguarding areas identified at extreme east of the Site only.	Scoped In	Not considered for the Consented Development but will be considered for the Proposed Development due to changes in policy and legislation as noted in Section A.4.3. Mineral safeguard area mapping to be reviewed alongside developing design to ensure no sterilisation will occur.
Damage to geological SSSIs or RIGGS *(construction phase)*		N/A – none identified in the Study Area	Scoped Out	N/A
Dewatering of excavations/trenches *(construction phase and occasional operational phase*	Via CEMP - treatment of water if necessary to reduce the sediment load and any contamination	Minor	Scope In	Not considered for the Consented Development but will be considered for the Proposed

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
maintenance activities)	prior to discharge (via an approved route).			Development due to changes in policy and legislation as noted in Section A.4.3. Further assessment required into potential effects of dewatering on groundwater flow and affect water quality and base flow of local watercourses and abstractions. Site-specific mitigation to be developed. Baseline data review to include BGS data, Envirocheck data, Local Authority data, and available site investigation reports.
Physical intrusion into groundwater *(construction phase)*	Any contamination encountered during the construction phase will be subject	Assessed as 'Not Significant' to 'Minor' for the Consented Development..	Scoped Out	N/A

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	to appropriate risk assessment and if necessary, either removed, treated and/ or mitigated as part of the Proposed Development. Solution mining and piling to be undertaken in line with industry good practice.			No change from Consented Development.
Encountering contamination during ground disturbance works *(construction phase and occasional operational phase maintenance activities)*	Any contamination encountered during the construction phase will be subject to appropriate risk assessment and, if necessary, either removed, treated and/ or mitigated as part of the Proposed Development	Assessed as 'Not Significant' for the Consented Development.	Scoped Out	N/A No change from Consented Development.
Exposure of workforce to health impacts from	Via CEMP - potential risks to human health from any encountered	Not significant – Mitigation in place via the CEMP will	Scoped Out	N/A

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
(unexpected) contamination *(construction phase and occasional operational phase maintenance activities)*	(unexpected) ground contamination will be avoided using appropriate Personal Protective Equipment (PPE) and by adopting appropriate working practices.	avoid significant effects. Assessed as to 'Not Significant' to 'Minor' for the Consented Development.		
Accidental spills/leaks (e.g. of fuels, lubricants, brine) *(construction phase and operational phase)*	Standard construction industry practices will be adopted to mitigate potential impacts from accidental spills or leaks. An Environmental Management System (EMS) and associated procedures will be in place during operation.		Scoped Out	N/A
Decommissioning Phase - impacts during decommissioning will be similar, and potentially less than, the construction phase (see above).				

A.7. EFFECTS SCOPED OUT OF THE EIA

A.7.1.1. The following sections detail the impacts that have been scoped out of the assessment (see **Table A.1**, above), together with the basis for doing so.

A.7.1.2. On the basis that there are no proposed changes to methodologies and procedures from the Consented Development which would result in changes to the assessment of effects, the following are scoped out:

- Temporary changes to soil function (e.g. by compaction, infiltration);
- Physical intrusion into groundwater; and
- Encountering contamination during ground disturbance.

A.7.1.3. Other effects that are scoped out comprise:

- Damage to geological SSSIs or RIGGS – no geological SSSIs or RIGGS have been identified within the Study Area;
- Exposure of workforce to health impacts from (unexpected) contamination – based on the baseline conditions, it is unlikely workers would encounter unexpected or unknown sources of contamination during construction activities (or occasional operational phase maintenance activities involving groundworks). Good practice safety mitigation measures will be incorporated into the CEMP and operational phase Environmental Management System (EMS); and
- Accidental spills/leaks (e.g. of fuels, lubricants, brine) - in the event of a spill or leak, this could affect local ground conditions and potentially groundwater quality underlying the area. However, embedded mitigation measures and measures in the CEMP will significantly reduce potential impacts by following specific prevention and containment measures such as refuelling of machinery in designated areas to control spillages, equipment checks etc.

A.8. PROPOSED APPROACH TO ASSESSMENT

A.8.1. BASELINE

A.8.1.1. The Geology and Ground Conditions impact assessment will consider potential effects on soils, geology, and groundwater resources and related designated sites and will include the following elements:

- A Phase 1 desk-based Environmental Site Assessment (ESA) will be completed for inclusion in the PEIR;
- Additional baseline information will be collated to allow the Conceptual Site Model to be developed. Site-specific data will be reviewed including a general search of the area using an environmental database (e.g., Landmark Envirocheck® Report, or similar);

- A supplementary Agricultural Land Classification (ALC) Survey will be completed for inclusion in the PEIR;
- An assessment of potential impacts on existing ground conditions will be undertaken as part of the EIA;
- Consultation with CWAC and other relevant statutory and non-statutory organisations will be undertaken as necessary; and
- Further site-specific ground investigation surveys (including a groundwater monitoring regime) for geological/geotechnical assessment are likely to be undertaken by the applicant or their appointed designers during the Pre-FEED and FEED (Front-End Engineering Design) stages of the Proposed Development.

A.8.2. TOPIC SPECIFIC METHODOLOGIES

A.8.2.1. Assessment methodologies in relation to geology and ground conditions will align with LCRM and IEMA guidance (as outlined in the 'Guidance' section, above). The potential impacts for this topic are characterised on the basis of the potential harm to a receptor within a given source-pathway-receptor combination, or a pollutant linkage and graded with a level of magnitude.

A.8.2.2. In order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences a source-pathway-receptor methodology is adopted, with the underlying principle that the identification of pollutant linkages consists of the following three elements:

- a source hazard (a substance or situation that has the potential to cause harm or pollution);
- a pathway (a means by which the hazard moves along); and
- a receptor/target (an entity that is vulnerable to the potential adverse effects of the hazard).

A.8.2.3. The same assessment methodology applies for the construction, operational and decommissioning phases. For this topic, the most significant effects will occur during construction of the Proposed Development.

A.8.3. ASSESSMENT CRITERIA

A.8.3.1. The sensitivity of potential receptors can be described qualitatively according to the categories presented in **Table A.2**.

TABLE A.2 RECEPTOR SENSITIVITY

Sensitivity	Receptor
High	• Human health: onsite residential developments, onsite construction workers • Controlled waters (groundwater): Source Protection Zone or highly productive aquifer • Soil resource: Presence of best and most versatile (BMV) land (Grades 1, 2 or 3a), surface mineral reserves, soils supporting nationally important environmental designated sites, high carbon sequestration soils (e.g. peat), or soils acting as important catchment pathways for water flow and/ or flood management.
Medium	• Human health: onsite commercial developments, offsite residential developments • Controlled waters (groundwater): Moderately productive aquifer • Soil resource: Presence of land of moderate quality (Grade 3b), sites supporting locally important environmental designated sites, moderate carbon sequestration soils (e.g. mineral soils), or soils acting as minor catchment pathways for water flow and/ or flood management.
Low	• Human health: transient or limited access, off site commercial development • Controlled waters (groundwater): Low productivity aquifer or rocks essentially with no groundwater • Soil resource: Presence of land of poor quality (Grade 4) or urban soils.

A.8.3.2. The magnitude of impacts will be determined by considering the intensity (or scale), spatial coverage and longevity of an impact. The magnitude of impact on the receptors is presented in **Table A.3**.

TABLE A.3 MAGNITUDE OF IMPACT

Impact Magnitude	Description	Example
Large	• Results in loss of attribute and/or likely to cause exceedance of statutory objectives and/or breach of legislation. • High degree of disruption to cultivation patterns and with high risk of change in land use.	• Contamination of a highly productive aquifer. • Loss or isolation of a strategic mineral resource. • Permanent or irreversible loss of soil functions (as set out in **Table A.4**) over an area of >20 ha, or loss or isolation of strategic mineral resource. • Impact of the health of a large number of human receptors, including off-site.
Medium	• Results in impact on integrity of attribute/or loss of part of attribute, and/or possibly cause exceedance of statutory objectives and/or breach of legislation. • Moderate degree of disruption to cultivation patterns with moderate risk of change in land use.	• Loss or isolation of a regional/local mineral resource. • Contamination of a moderately productive aquifer. • Reduction in the value of a feature, permanent or irreversible loss of soil functions (as set out in **Table A.4**) over an area of 5 – 20 ha, or loss or isolation of regional/local mineral resource. • Impact on the health of on-site human receptors (i.e. the workforce).
Small	• Results in minor impacts on receptor. • Minimal degree of disruption to cultivation patterns and low risk of change in land use.	• Measurable change in receptor, but of limited size/proportion. • Contamination of a minor aquifer. • Reduction in the value of a feature, permanent or irreversible loss of soil

Impact Magnitude	Description	Example
		functions (as set out in **Table A.4**) over an area of <5 ha, or a temporary, reversible loss.
Negligible	• No loss or alteration of characteristics, features or elements, no observable impact in either direction. • Minimal or no disruption to cultivation patterns and very low risk of change in land use.	• No significant loss in quality of receptor.

A.8.3.4. The significance of effect is determined by assessing the potential magnitude of impact on the receptors against the sensitivity of the receptor. **Table A.4** presents the matrix showing the significance of effects. Moderate or major effects are considered significant in EIA terms.

TABLE A.4 SIGNIFICANCE OF EFFECT

Impact Magnitude	**Magnitude of Impact**			
	Negligible	**Small**	**Medium**	**Large**
High	Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant	Major Adverse – Significant
Medium	Not Significant	Minor Adverse – Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant
Low	Not Significant	Not Significant	Minor Adverse – Not Significant	Minor Adverse – Not Significant

A.9. SUMMARY AND CONCLUSIONS

A.9.1.1. The baseline environment in relation to geology and ground conditions is materially unchanged since the Consented Development. Effects scoped in for further assessment are limited to those which may change as a result of changes to the Proposed Development compared to the Consented Development, or were not assessed in the Consented Development, namely the loss of BMV agricultural soils, sterilisation of mineral reserves and dewatering of excavations.

APPENDIX B HYDROLOGY AND FLOOD RISK

B. HYDROLOGY AND FLOOD RISK

B.1.1 INTRODUCTION

B.1.1.1 Keuper Gas Storage Limited (hereafter referred to as 'the Applicant') are proposing a Material Change (MC) to the Keuper Gas Storage Project (KGSP) Consented Development to construct and operate an underground hydrogen storage facility (hereafter known as the 'Proposed Development'). The location of the Proposed Development is on and under land in the Holford Brinefield, Middlewich in the Chester West and Chester region and is shown on **Figure 2.1**.

B.1.1.2 This chapter has been prepared with reference to and should be read in conjunction with Chapter 7 of the Original ES for the Consented Development. This chapter will focus on changes to the baseline environment and potential effects on hydrology and flood risk as a result of the Proposed Development (described in Chapter 2, Proposed Development Description).

B.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

B.2.1.1 The assessment will be undertaken in line with the following policy and guidance:

- Water Framework Directive (2000/60/EC)[22];
- EU Floods Directive[23];
- Water Act 2014[24];
- Environment Act 2021[25];
- Environmental Targets (Water) (England) Regulations 2023[26];
- Flood and Water Management Act 2010[27];
- Water Resources Act 1991[28];
- Water Act (2003)[29];
- Bathing Water Regulations[30];

[22] European Parliament (2000) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ("The Water Framework Directive"). Available online at: http://ec.europa.eu/environment/water/water-framework/index_en.html
[23] European Parliament (2007) Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32007L0060
[24] UK Government (2014) Water Act 2014. Available online at: https://www.legislation.gov.uk/ukpga/2014/21/contents/enacted
[25] UK Government (2021) Environment Act 2021. Available online at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted
[26] UK Government (2023) The Environmental Targets (Water) (England) Regulations 2023 (SI 2023/93). Available online at: https://www.legislation.gov.uk/uksi/2023/93/contents/made
[27] UK Government (2010) Flood and Water Management Act 2010. Available online at: https://www.legislation.gov.uk/ukpga/2010/29/contents
[28] UK Government (1991) Water Resource Act 1991. Available online at: https://www.legislation.gov.uk/ukpga/1991/57/contents
[29] UK Government (2003) Water Act. Available online at: https://www.legislation.gov.uk/ukpga/2003/37/contents
[30] UK Government (2013) The Bathing Water Regulations 2013. Available online at: https://www.legislation.gov.uk/uksi/2013/1675/contents/made

- Land Drainage Act 1991[31];
- Conservation of Habitats and Species Regulations 2017[32];
- Water Supply (Water Quality) Regulations 2016[33];
- Private Water Supplies (England) Regulations 2018[34];
- Environmental Permitting (England and Wales) Regulations 2016[35];
- Environmental Damage (Prevention and Remediation) Regulations 2017[36];
- Groundwater (England and Wales) Regulations 2009[37];
- Flood Risk (England and Wales) Regulations[38] (revoked);
- National Planning Policy Framework (NPPF)[39];
- West Cheshire Strategic Flood Risk Assessment 2008[40];
- Department for Energy Security & Net Zero National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2)[41];
- Construction Industry Research and Information Association (CIRIA) Control of Water Pollution from Construction Sites (C532);
- CIRIA Development and flood risk: guidance to the construction industry, C624D;
- British Standard Code of Practice for Earthworks BS 6031 200928;
- Safeguarding our soils: A strategy for England 2011;
- CIRIA The SuDS Manual (C753);
- CIRIA Environmental Good Practice on Site (C741);
- Department of Communities and Local Government (DCLG) Planning practice guidance: flood risk and coastal change 2017;
- Highways Agency's Design Manual for Roads and Bridges (DMRB) LA 113 – Road drainage and the water environment, formerly HD45/09, Revision 1, 2020;

[31] UK Government (1991) The Land Drainage Act 1991. Available online: https://www.legislation.gov.uk/ukpga/1991/59/contents
[32] European Parliament (2017) Conservation of Habitats and Species Regulations 2017. Available online at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made
[33] European Parliament (2017) The Water Supply (Water Quality) Regulations 2016. Available online at: https://www.legislation.gov.uk/uksi/2016/614/contents/made
[34] UK Government (2018) The Private Water Supplies (England) (Amendment) Regulations 2018. Available online at: https://www.legislation.gov.uk/uksi/2018/707/contents/made
[35] UK Government (2016) The Environmental Permitting (England and Wales) Regulations 2016. Available online at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made
[36] HMSO (2015) The Environmental Damage (Prevention and Remediation) (England) Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/810/pdfs/uksi_20150810_en.pdf
[37] HMSO (2009) The Groundwater (England and Wales) Regulations 2009. Available at: https://www.legislation.gov.uk/ukdsi/2009/9780111480816/pdfs/ukdsi_9780111480816_en.pdf
[38] HMSO (2009) The Flood Risk (England and Wales) Regulations 2009. Available at: https://www.legislation.gov.uk/uksi/2009/3042/pdfs/uksi_20093042_en.pdf
[39] Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework. Available online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2
[40] West Cheshire SFRA. June 2008. West Cheshire SFRA Summary Report.pdf Accessed February 2025.
[41] Department for Energy Security & Net Zero National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2). Presented to the Houses of Parliament pursuant to section 9(8) of the Planning Act 2008. Accessed February 2025. Available online at: Fossil Fuel Electricity Generating Infrastructure National Policy Statement - EN-2

- EA Guidance for Pollution Prevention;
- National Flood and Coastal Erosion Risk Management Strategy 2022;
- EA Peak river flow climate change allowances by management catchment 2022:
- EA Peak rainfall climate change allowances by management catchment 2022;
- Discharges to surface water and groundwater: environmental permits; and
- Apply for a water abstraction or impounding licence.

B.3 BASELINE ENVIRONMENT

B.3.1 STUDY AREA

B.3.1.1 For the purposes of scoping, the Study Area remains the same as the Consented Development for the KGSP which is shown in shown on **Figure 2.1, Scoping Boundary**. The Hydrological Study Area will be presented in Chapter 7, Hydrology and Flood Risk of the PEIR and ES.

B.3.2 DATA SOURCES - SCOPING

B.3.2.1 The following sources have been used to assess the baseline:

- Chapter 7, Geology, Land and Water Quality of the Original ES (2015) for the Consented Development.
- Keuper Gas Storage Project Flood Risk Assessment. Document Reference 5.2. October 2015[42] submitted as part of the Original ES for the Consented Development.
- Google Maps / Google Earth[43].
- Ordnance Survey Open River GIS dataset[44].
- Water Framework Directive datasets (i.e., EA River Basin Management Plans)
- British Geological Survey Hydrogeological 1:625,000 scale mapping[45].
- Environment Agency (EA) Flood Maps[46].

B.3.3 DESCRIPTION

Surface Water

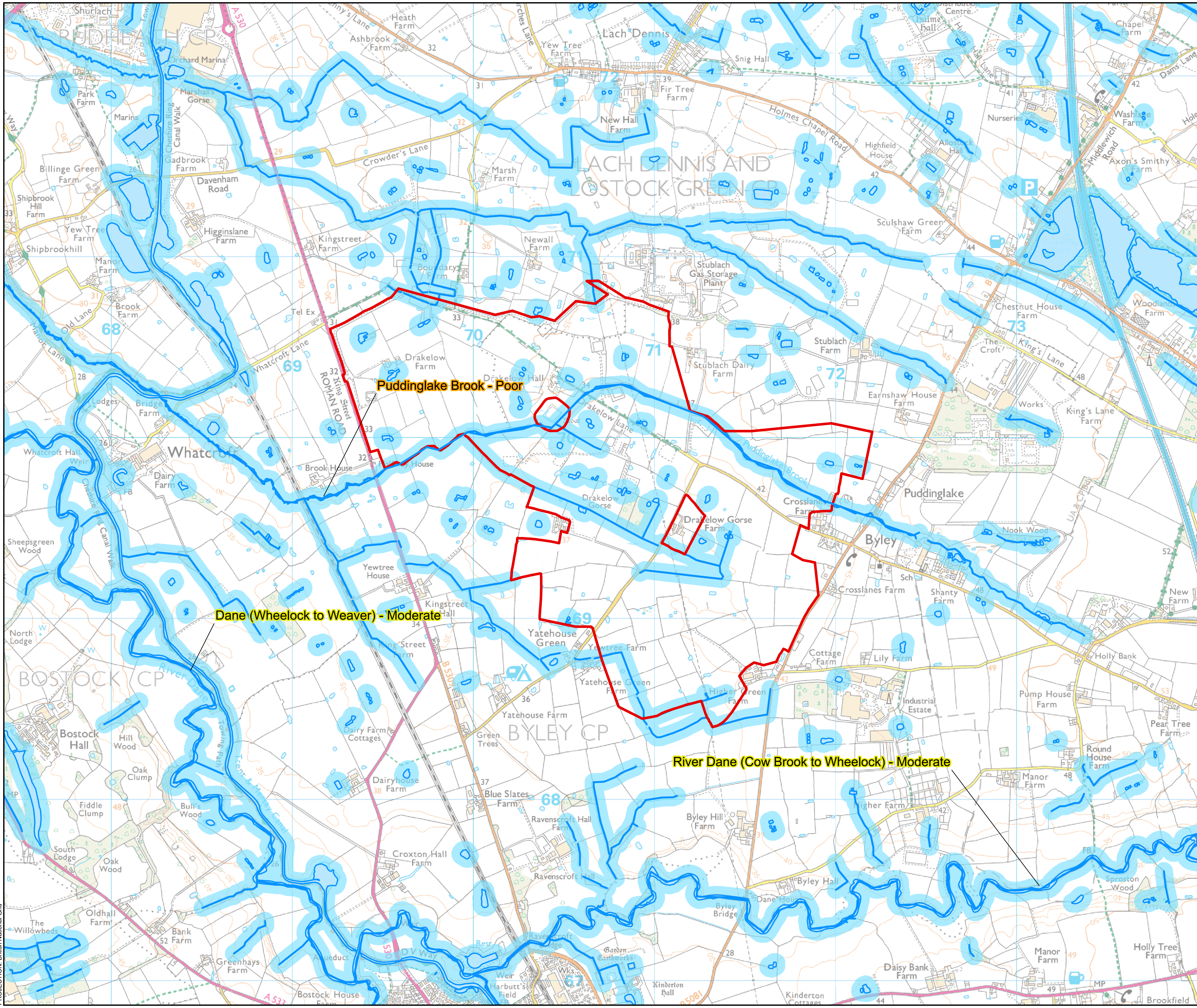
B.3.3.1 The hydrology of the Study Area remains as per Section 7.3.33 of Chapter 7 of the Original ES for the Consented Development and supporting Flood Risk Assessment (**Figure B.1**).

[42] Produced as part of the Original ES for the Consented Development.
[43] Available at: Google Earth Accessed February 2025.
[44] OS Open Rivers | Data Products | OS Accessed February 2025.
[45] British Geological Survey Geology Viewer. Available at: BGS Geology Viewer - British Geological Survey Accessed February 2025.
[46] Available at: Flood risk information for this location - Flood map for planning - GOV.UK Accessed February 2025.

B.3.3.2 Since submission of the Consented Development the status of the Puddinglake Brook which runs through the Study Area has been downgraded from Moderate to Poor ecological status and has a chemical status of "Fail" under the 2022 EA River Basin Management Plan (RBMP) assessment[34] (**Figure B.2**).

B.3.3.3 Several elements of the Proposed Development fall within the 50 m buffer of watercourses on-site.

B.3.3.4 The Proposed Development will require the removal of two ponds located in the GPP area in the Study Area. The source of the ponds (surface or groundwater fed) and any associated impacts as a result of their removal will be considered as part of the PEIR and ES.



Scoping Boundary
Surface Water
Surface Water 50 m Buffer

0 200 400 600 800 1,000
Metres
N

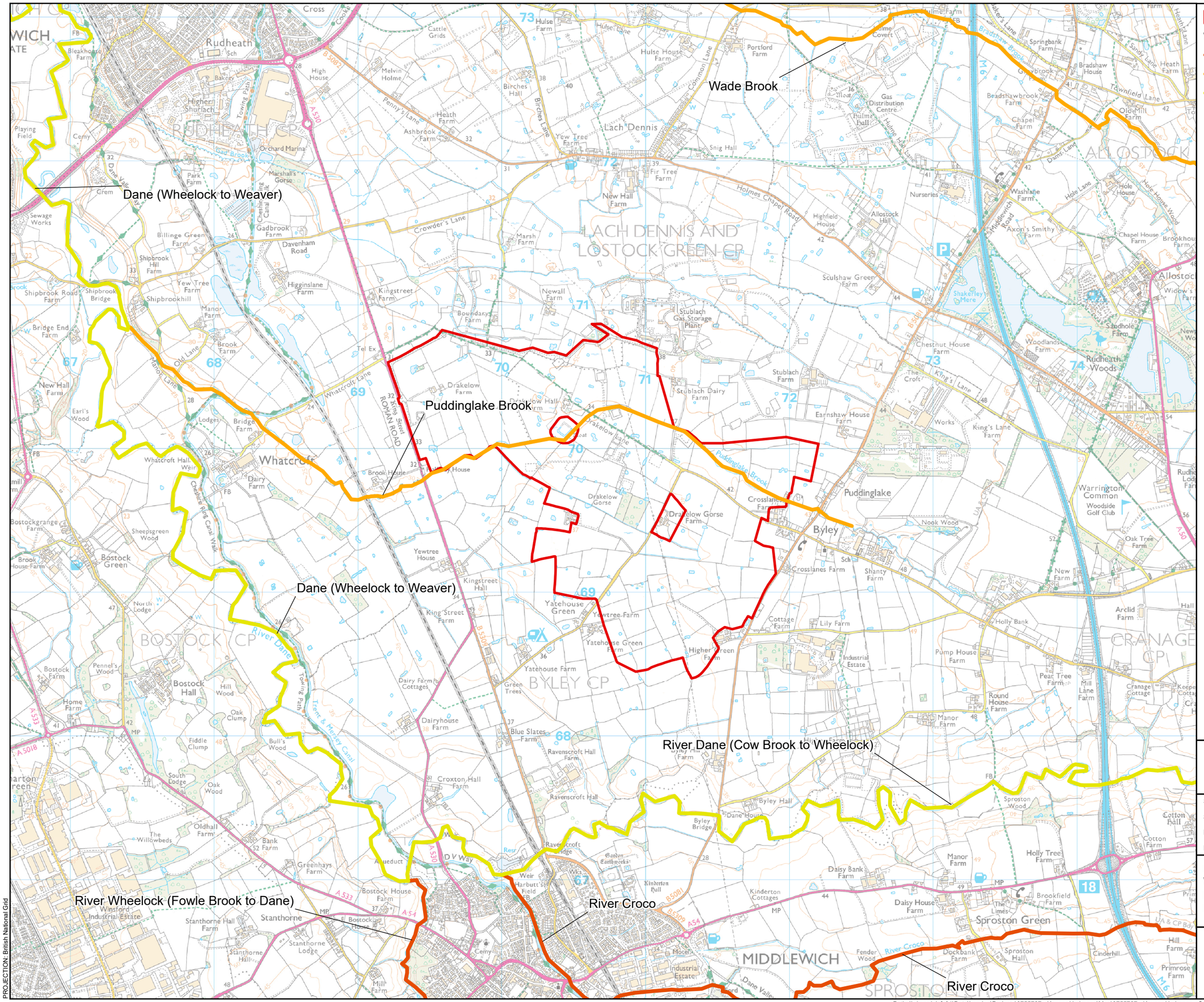
SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED:
DATE: 18/03/2025	APPROVED:

Figure B.1
Surface Water Hydrology
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - Surface Water Hydrology - A01



Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - WFD Waterbody Status - A01

Flood Risk

B.3.3.5 A Flood Risk Assessment was carried out as part of the ES for the Consented Development. The Study Area falls within Flood Zones 2 and 3 (**Figure B.3**). Flood Zone 2 is defined as land that has an annual probability of flooding every year of 1 in 100 to 1 in 1,000 and Flood Zone 3 is defined as land that has an annual probability of flooding every year of 1 in 100 or less. This remains the case and two buildings, the Gas Processing Plant, and a wellhead are all located within the indicative Flood Zones of the Puddinglake Brook.

B.3.3.6 The EA spatial flood defences dataset indicates that along the banks of Puddinglake Brook there are flood defences which are categorised as natural high ground. The defences are identified as having a standard of protection of 20%, indicating the natural high ground provides protection against flood events with a 20% annual occurrence probability.

B.3.3.7 The EA surface water map[47] indicates the Study Area is at risk of pluvial flooding (**Figure B.4**). In some areas the indicative flood extents follow the course of the Puddinglake Brook and other drainage ditches in the Study Area, however there are areas of ponding and other flowpaths across the Study Area indicated in the mapping.

B.3.3.8 The Study Area is underlain by a low productivity aquifer with bedrock of mudstone, siltstone, and sandstone, and the overlying superficial geology is glacial till deposits. The hydrogeological baseline of the Study Area is covered in more detail in Appendix A, Geology and Ground Conditions. As per the Flood Risk Assessment submitted as part of the Original ES for the Consented Development, the Study Area is not considered at risk of groundwater flooding.

B.3.3.9 The EA reservoirs map[48] shows potential risk of reservoir flooding from the former quarries at Allostock which now form large lakes following the end of extraction (**Figure B.5**). The indicative inundation area is north of and outwith the Study Area, therefore the Study Area is not anticipated to be at risk of flooding from this source.

B.3.3.10 The changes outlined in Chapter 2, Proposed Development Description could result in an overall increase in the area of impermeable surfaces on Site and thus potential for increases in runoff and flood risk.

[47] EA Surface water map. Available at: Surface water map - Check your long term flood risk - GOV.UK Accessed February 2025.
[48] EA Reservoirs map. Available at: Technical map - Check your long term flood risk - GOV.UK Accessed February 2025.

Scoping Boundary
Flood Map Zone 2
Flood Map Zone 3

0 200 400 600 800 1,000
Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED: BMcl
DATE: 21/03/2025	APPROVED:

Figure B.3
Fluvial Flood Risk
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - Flood Risk Fluvial - A01

Scoping Boundary

Risk of Flooding from Surface Water
1 in 30 years Extent

Risk of Flooding from Surface Water
1 in 100 years Extent

Risk of Flooding from Surface Water
1 in 1000 years Extent

0 200 400 600 800 1,000
Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED: BMcl
DATE: 21/03/2025	APPROVED:

Figure B.4
Pluvial Flood Risk
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - Flood Risk Pluvial - A01

Scoping Boundary

Reservoir Flood Extents - Wet Day

0 200 400 600 800 1,000

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED: BMcl
DATE: 21/03/2025	APPROVED:

Figure B.5
Reservoir Inundation
Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - Flood Risk Reservoir Inundation - A01

Water Resources

B.3.3.11 The hydrogeology of the Study Area remains as per Section 7.3.29 of Chapter 7 of the Original ES for the Consented Development.

B.3.3.12 As detailed in Section 7.3.42 and 7.3.43 of Chapter 7 of the Original ES for the Consented Development, there are a number of licensed discharges and abstractions in the area. It is assumed the consented licences for the abstractions will be used as per the Original ES for the Consented Development. However, updates on the status of these abstractions will be obtained as part of the PEIR and ES.

B.3.3.13 There are no drinking water protected areas in the Study Area.

Designated Sites

B.3.3.14 As per Section 7.3.44 of Chapter 7 of the Original ES for the Consented Development, there are no designated environmentally sensitive sites within the Study Area.

B.3.4 KEY SENSITIVITIES

B.3.4.1 Sensitive receptors are considered to be:

- Surface waterbodies including Puddinglake Brook;
- Groundwater bodies;
- Abstractions; and
- Changes to flood risk.

B.4 BASIS OF ASSESSMENT

B.4.1.1 The main aspects of the Proposed Development that could lead to impacts on hydrology and flood risk during construction are as follows:

- chemical pollution and sedimentation of watercourses and the wider hydrological environment due to construction works;
- chemical pollution because of fires, leaks or spillages;
- pollution from construction vehicles or plant on Site;
- impediments to watercourse from shallow and deep foundations;
- increased run-off and flood risk due to the GPP area extension, new access tracks, new laydown area and construction work changes outlined in Chapter 2, Proposed Development Description;
- compaction of soils and superficial deposits and reduction in ability of such deposits to store water in relation to flood risk

B.4.1.2 Long-term effects from the operation and maintenance phase could include:

- increased run-off and flood risk from increased GPP area footprint and new permanent access tracks;
- pollution risks from operational processes on Site, associated with the movement, and storage of hydrogen; and
- pollution from operational traffic.

B.4.1.3 Impacts from each of the above activities are highlighted in **Table B.1** are unlikely to lead to significant effects with the application of good practices and mitigation measures to be included in design.

B.5 MITIGATION

B.5.1.1 As outlined in Chapter 7 of the Original ES for the Consented Development, embedded mitigation and good practice measures will be put in place. The Principal Contractor will develop a Construction Environmental Management Plan (CEMP) which will address matters such as the control of surface water run-off and drainage, storage and handling of fuels, lubricant oil, and other hazardous materials, and pollution prevention measures to protect the water environment. An outline CEMP was submitted as part of the Original ES for the Consented Development[49].

B.5.1.2 The CEMP may include or be supplemented by a:

- Soil Management Plan (SMP);
- Sediment Erosion and Control Plan (SECP);
- Drainage Management Plan (DMP); and
- Pollution Prevention Plan (PPP).

B.5.1.3 An equivalent to the CEMP would be drafted and adhered to during the operation and maintenance phases of the Proposed Development.

B.5.1.4 Further details on the methodology for surface water drainage are detailed in Section 0.

B.6 LIKELY SIGNIFICANT EFFECTS - EIA

B.6.1.1 The table below lists the likely significant effects for hydrology and flood risk.

B.6.1.2 With implementation of the mitigation measures set out in Section B.5 above, it is predicted that the likely significance of effect of the Proposed Development on hydrology would be not significant.

[49] Keuper Gas Storage Project. Construction Environmental Management Plan. October 2015. Application Reference No. EN030002.

TABLE B.1 EFFECTS SCOPED IN / OUT FOR HYDROLOGY AND FLOOD RISK

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Excavation of materials / soil could result in sedimentation of, and contaminated soil entering, surface waterbodies. Removal of on-Study Area ponds could also result in sediment and contaminated water entering surface waterbodies.	CEMP including a SMP, SECP, and DMP.	Not Significant	In - as per the Original ES for the Consented Development, with implementation of the appropriate mitigation measures no significant impacts are anticipated. However, removal of the on-site ponds was not assessed as part of the Original ES for the Consented Development, and is therefore now scoped in.	Identify the source of the water for the ponds (groundwater / surface water fed). Identify surface water connections to the ponds e.g. connectivity to the floodplain / Puddinglake Brook.
Accidental spills or leaks, and use of construction vehicles which could lead to direct or indirect surface water contamination.	CEMP including a PPP	Not Significant	Out - as per the Original ES for the Consented Development, with implementation of the appropriate mitigation measures no significant impacts are anticipated. The changes forming the Proposed Development	N/A

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
			do not alter these conclusions.	
Potential spill or accidental leakage of drilling fluids and / or process water which could contaminate surface waterbodies.	CEMP PPP DMP	Not Significant	Out - as per the Original ES for the Consented Development, with implementation of the appropriate mitigation measures no significant impacts are anticipated. The changes forming the Proposed Development do not alter these conclusions.	N/A
Discharge of foul water from welfare facilities which could negatively impact surface waterbodies.	CEMP PPP DMP	Not Significant	Out - as per the Original ES for the Consented Development, with implementation of the appropriate mitigation measures no significant impacts are anticipated. The changes forming the Proposed Development do not alter these conclusions.	N/A

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Physical presence of infrastructure will result in greater impermeable surfaces and therefore greater runoff potentially increasing the risk of flooding on-site and at downstream receptors.	Study Area specific Flood Risk Assessment DMP	Not Significant	In – as per the Original ES for the Consented Development, mitigation to control runoff will be in place. However, due to the potential changes to the footprint of the Proposed Development this ES will consider flood risk again for the Study Area.	Total footprint of impermeable surfaces. Watercourse crossings on the new access track to be confirmed.
Physical presence of temporary and permanent infrastructure will potentially alter surface runoff volumes, rates, and patterns which has the potential to effect habitats and surface waterbodies and abstractions.	DMP SuDS	Not Significant	In – as per the Original ES for the Consented Development, mitigation so control runoff will be in place. However, due to the potential changes to the footprint of the Proposed Development this ES will consider flood risk again for the Study Area.	Total footprint of impermeable surfaces. Watercourse crossings on the new access track to be confirmed.

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Process water will be generated and need disposed of.	Excess water to be piped off-site using the existing brine pipe network.	Not Significant	Out - as per the Original ES for the Consented Development, with implementation of the appropriate mitigation measures no significant impacts are anticipated. The changes forming the Proposed Development do not alter these conclusions.	
Cumulative impacts to the water environment as a result of several developments within the same hydrological catchment.	All developments should have CEMPs and other mitigation measures in place to avoid significant impacts to the water environment, and therefore cumulative impacts.	Not Significant	In – a list of other developments in the area will be compiled and the potential for significant impacts considered.	List of other developments within 5 km of the Study Area.

B.7 PROPOSED APPROACH TO ASSESSMENT

B.7.1 BASELINE

B.7.1.1 As set out in above, it is predicted that the likely significance of effect of the Proposed Development on hydrology would be not significant.

B.7.1.2 Table B.1 above the hydrology assessment of the Proposed Development will consider potential effects on flood risk.

B.7.2 SPECIFIC METHODOLOGIES

B.7.2.1 The potential impacts for this topic are characterised on the basis of the potential harm to a receptor within a given source-pathway-receptor combination or pollutant linkage and graded with a level of magnitude.

B.7.3 ASSESSMENT CRITERIA

B.7.3.1 The sensitivity of potential receptors can be described qualitatively according to the categories presented in Table B.2.

TABLE B.2 SENSITIVITY / VALUE OF RECEPTOR

Sensitivity	Receptor
High	International or national level importance. Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement. Typical examples: RBMP watercourses classified as High or Good ecological potential under the WFD. Sites protected under EU or UK wildlife legislation e.g. SSSI, SAC, SPA. Study Area within a groundwater or surface water protection zone.
Medium	Regional, county, and district level importance. Receptor with a medium quality and rarity, regional scale and limited potential for substitution / replacement. Typical examples: RBMP watercourses classified as Medium ecological potential under the WFD. Locally or regionally important ecological status.
Low	Local importance. Receptor is on-site or on neighbouring site with a low quality and rarity. Environmental equilibrium is stable and resilient to changes greater than natural fluctuations. Typical examples: RBMP watercourses classified as Poor ecological potential under the WFD. Outwith a flood zone.

B.7.3.2 The magnitude of impacts will be determined by considering the intensity (or scale), spatial coverage and longevity of an impact. The magnitude assigned will also use professional judgement to take into consideration the application of statutory standards and non-statutory standards or guidelines. The magnitude of impact on the receptors is presented in Table B.3.

TABLE B.3 MAGNITUDE OF IMPACT

Impact Magnitude	Description	Example
Large	Results in a loss or change of quality and quantity and the integrity of the resource. Following development, the baseline situation is fundamentally changed.	Change to the RBMP classification of a watercourse, increase in flood risk, changes to water supply quantity and quality.
Medium	Change to the quality and quantity of the resource but is not fundamentally changed.	Impact to the RBMP status of a watercourse, change in flood risk, moderate changes to water supply quantity and quality.
Small	Following development, the baseline situation is largely unchanged with barely discernible differences.	Measurable changes but of limited extent / duration. Small change to RBMP element of a watercourse, small change to water supply quantity and quality.
Negligible	Impacts unlikely to be detectable.	No change to RBMP classification of a watercourse, no changes to flood risk, and no change to water quality or quantity.

B.7.3.3 The significance of effect is determined by assessing the potential magnitude of impact on the receptors against the sensitivity of the receptor. Table B.4 presents the matrix showing the significance of effects. Moderate or major effects are considered significant in EIA terms.

TABLE B.4 SIGNIFICANCE OF EFFECTS

Impact Magnitude	Magnitude of Impact			
	Negligible	Small	Medium	Large
High	Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant	Major Adverse – Significant
Medium	Not Significant	Minor Adverse – Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant

Impact Magnitude	Magnitude of Impact			
	Negligible	Small	Medium	Large
Low	Not Significant	Not Significant	Minor Adverse – Not Significant	Minor Adverse – Not Significant

B.7.4 FLOOD RISK ASSESSMENT METHODOLOGY

B.7.4.1 The NPPF requires all possible forms of flood risk to be considered within Flood Risk Assessments (FRAs) and lists six forms of flooding that should be assessed. As such an FRA will be completed as part of the ES as a technical appendix to the Water Resource and Flood Risk chapter. The FRA will assess the risk of flooding in the Study Area and the potential to increase flood risk elsewhere in relation to each of the different forms of flooding listed within the NPPF; fluvial, surface water, tidal, groundwater, sewers and artificial bodies.

B.7.4.2 The fluvial flood risk from the Puddinglake Brook will be furthered assessed to identify whether additional hydraulic modelling is required to identify the critical flood level from the watercourse for a 1 in 100-year plus climate change scenario.

B.7.4.3 The FRA will assess the potential risk of flooding which accounts for increases in rainfall and river levels due to climate change, based on the appropriate climate change allowance for the catchment which the Study Area is located within.

B.7.4.4 The Proposed Development will be designed to remain operational without resulting in an increase in flood risk elsewhere in a 1 in 100-year plus climate change event, using outputs from flood modelling of an appropriate level of detail based on EA guidance. Where there is a potential increase in flood risk elsewhere or a reduction in floodplain storage capacity suitable flood storage mitigation measures will be incorporated into the design and quantifiably assessed if required.

B.7.4.5 As part of the FRA the sequential design approach will be applied to locate infrastructure within Flood Zone 1 where feasible, however it is possible that some areas comprising infrastructure will be located within Flood Zone 2 and 3. Where it is not possible to locate infrastructure within Flood Zone 1, hydraulic modelling outputs will be used to identify flood extents and ensure infrastructure is not located within Flood Zone 3b (where modelling results provide flood extents for a 1 in 30-year event).

B.7.4.6 Where infrastructure is located within Flood Zone 2 or 3 the FRA will include a suitable assessment to outline how the requirements of the sequential and exception test have been satisfied.

B.7.5 SURFACE WATER DRAINAGE METHODOLOGY

B.7.5.1 A Drainage Management Plan (DMP) will be developed as part of the ES as an appendix to the water resources and flood risk chapter, which will inform the design principles of the detailed drainage design. The Surface Water Drainage Strategy (SWDS) will develop a drainage approach to ensure there is no significance increase in surface water runoff from the Proposed Development in up to and including the 1 in 100-year (1%) scenario, including an appropriate allowance for climate change.

B.7.5.2 The DMP will establish surface water interception and discharge measures for hardstanding areas in accordance with local and national best practice Sustainable Drainage Systems (SuDS) guidance and policy which will prevent an increase in surface water runoff and provide protection to the receiving water environment.

B.7.5.3 Prior to the production of the DMP, the Lead Local Flood Authority (LLFA) will be consulted to agree on a methodology including discharge options, attenuation and interception measures, design return periods, discharge rates, climate change allowances and design layouts.

B.8 SUMMARY AND CONCLUSIONS

B.8.1.1 Since submission of the Original ES for the Consented Development, the only change to the baseline hydrology of the Study Area has been a change in the RBMP status of the Puddinglake Brook from Moderate to Poor ecological status.

B.8.1.2 The main change introduced by the Proposed Development which is likely to affect hydrological resources is the extension of the GPP area. This could result in changes to the permeability of the Study Area and therefore the potential to alter water quantity and increase flood risk.

B.8.1.3 As per the conclusions of Chapter 7 of the Original ES for the Consented Development, with appropriate mitigation in place (as set out in Section B.4 of this technical appendix) the impact on flood risk is expected to be not significant. However, due to the changes in the Proposed Development flood risk will be scoped in and a new Flood Risk Assessment produced.

B.8.1.4 Effects on surface water quality from the Proposed Development as a result of sedimentation, accidental spills and releases, and release of foul water are anticipated to result in not significant impacts assuming implementation of the appropriate mitigation measures in line with the conclusions of the Original ES of the Consented Development. These elements have thus been scoped out of further assessment.

APPENDIX C AIR QUALITY

C. AIR QUALITY

C.1 INTRODUCTION

C.1.1.1 This chapter addresses ambient air quality, providing a brief overview of the existing conditions and the Proposed Development setting, identifies the effects to be considered and details the proposed approach to assess the effects of the proposed development on sensitive receptors.

C.1.1.2 The expected emissions during the construction phase of the project include:

- dust emissions from construction activities; and
- NO_x from construction vehicles and equipment.

C.1.1.3 During the operational phase of the project, emergency flaring or venting will be required for routine maintenance, which will be a limited number of events, or for emergency situations. Venting or flaring will be decided during detailed design, with the impact assessment assuming a worst case scenario.

C.1.1.4 It is known that under specific conditions, hydrogen sulphide may form in hydrogen storage caverns, and this impurity may go forward with the hydrogen to the GPP. A number of well-established technologies / solutions have been identified to mitigate this risk. The project design is working towards minimising / eliminating this risk and if still present then capturing and disposing of it safely from the process stream, there will be no venting and/or flaring of hydrogen sulphide.

C.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

C.2.1.1 Key items of policy, legislation, guidance and standard relevant to air quality in the context of the Proposed Development are as follows:

- Clean Air Strategy 2019
- Air Quality Standards Regulations 2010
- The Environment Act 1995 (Part IV)
- National Policy Statements (including NPS for Overarching Energy (EN-1)[50] and NPS for Oil and Gas Supply and Storage (EN-4)[51];
- Air Quality Standards imposed in UK law[52] transposed from EU standards[53] and

[50] Overarching National Policy Statement for Energy (EN-1), January 2024. Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1
[51] National Policy Statement for Electricity Networks Infrastructure (EN-5), January 2024. Available at: https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4
[52] The Air Quality Standards Regulations 2010 Statutory Instrument 2008/301, http://www.legislation.gov.uk/uksi/2010/1001/contents/made
[53] European Union Air Quality Standards, http://ec.europa.eu/environment/air/quality/standards.htm

- Environmental Assessment Levels set out by the Environment Agency;
- Air emissions risk assessment for your environmental permit, Environment Agency online resource[54];
- Environmental permitting: air dispersion modelling reports, Environment Agency online resource[55];
- Guidance on the assessment of the air quality effects of development on designated nature conservation sites prepared by the Institute of Air Quality Management, IAQM, 2019;
- Assessment of dust from demolition and construction sites v2.2, IAQM, 2024;
- Guidance on land-use planning and development control: Planning for air quality v1.2, IAQM, 2017; and
- Department for Environment Food and Rural Affairs, (Defra) Local Air Quality Management Technical Guidance TG (22), Defra, 2022.

C.3 BASELINE ENVIRONMENT

C.3.1 STUDY AREA

C.3.1.1 The Air Quality Study Area has been defined on the basis of the Proposed Development activities. In general, air quality impacts will be limited to a maximum of 250 m from any construction activities, as this is the maximum distance downwind that dust will travel as a precautionary approach, and 250 m from construction access routes.

C.3.1.2 If flaring is included as an option for emergency shutdown, this shall be assessed in line with Environment Agency modelling methodologies and will consider impacts up to a distance of 10 km from the flare. If venting is included as the preferred option for emergency shutdown, the methodology to assess Air Quality effects will be included in the PEIR and ES based on professional judgement.

C.3.2 SENSITIVE ECOLOGICAL RECEPTORS

C.3.2.1 In the case of flaring, combustion activities might be associated with potential impacts to ecological receptors.

C.3.2.2 The assessment of impacts on ecology has not yet been defined as part of the scoping, and as such any site-specific Critical Loads and Critical Levels have not yet been identified.

C.3.3 BASELINE

SITE LOCATION

C.3.3.1 The Councils of Cheshire West and Chester, along with Cheshire East, conduct air quality monitoring using diffusion tubes and automatic

[54] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[55] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports#estimate-model-uncertainty

monitoring stations. These systems monitor the following pollutants $PM_{2.5,}$ PM_{10}, $NO_{2,}$ $SO_{2.}$

C.3.3.2 Cheshire East operates one real-time monitoring station that automatically measure $PM_{10,}$ $PM_{2.5}$, NO_2 and over 80 passive monitoring of $NO_{2.}$

C.3.3.3 Cheshire West and Chester Council operates six real-time monitoring stations that automatically measuring the following pollutants NO_2, SO_2, and PM_{10} as well as $PM_{2.5}$, along with weather data. These stations are classified as either roadside or industrial sites and are strategically located throughout the borough.

C.3.3.4 Additionally, over 80 diffusion tubes are deployed to monitor NO_2 levels at various locations. The data collected is assessed annually in Local Air Quality Management reports.

C.3.3.5 The Proposed Development is not located within an Air Quality Management Area (AQMA). Cheshire West and Chester Council has four AQMA in the borough. In three areas (Chester, Ellesmere Port and Frodsham) the main source of air emissions is NO_2 from road traffic. In Thornton-le-Moors the main pollutant of interest is SO_2 from industrial sources.

C.3.3.6 UK DEFRA 2023 background maps for the Scoping Boundary show:

- annual mean PM_{10} levels below 13 µg/m^3 (UK air quality standard is 40 µg/m^3);
- annual mean NO_x levels below 10 µg/m^3 (UK air quality standard is 30 µg/m^3);
- annual mean NO_2 levels below 10 µg/m^3 (UK air quality standard is 40 µg/m^3); and
- dust baseline is not monitored, but similar to PM is expected to be well below nuisance thresholds

C.3.3.7 The closest automatic monitoring location to the site is Middlewich, which is approximately 5 km from the Proposed Development. The pollutant monitored in Middlewich is $PM_{2.5}$ and monitoring started on the 13th of November 2024.

- annual mean $PM_{2.5}$ levels are about 8.54 µg/m^3 (UK air quality standard is 20 µg/m^3).

C.3.4 DATA SOURCES - SCOPING

C.3.4.1 The data sources used to inform this Air Quality Chapter of the scoping are as follows:

- Cheshire West and Chester, 2024, Air Quality Annual Status Report (ASR) In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management;
- Chesire East Borough Council, 2024 Air Quality Annual Status Report (ASR), In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management;

- Defra (Department for Environment, Food and Rural Affairs) provides comprehensive information on air quality[56];

C.3.4.2 The main source of emissions within Cheshire East Council and Cheshire West is road traffic therefore the pollutants of concern are NO2 and particulate matter.

C.3.5 KEY SENSITIVITIES

C.3.5.1 The key sensitivity areas within the Project area receptors include educational and health care facilities, residential areas, parks and recreational areas and places of worship.

C.4 BASIS OF ASSESSMENT

C.4.1.1 The air quality scoping assessment is based on the following:

- The temporary and permanent project footprints and an additional 250 m buffer;
- the likely nature, location and extent of the construction activities; and
- the likely nature of operational and maintenance activities including the presence of a flare or vent.

C.4.1.2 The methodology used to assess impacts for the construction of the Proposed Development is based on IAQM guidance[57].

C.4.1.3 Flare emissions if present will be assessed quantitatively using dispersion modelling.

C.4.1.4 The sensitivity of receptors within the radius of potential impacts from dust raising (250 m from construction activities and 250 m from access roads, 10 km for flare emissions), is to be considered high for all types of receptors (residential areas, schools, hospitals etc.) within the framework of the dust impact assessment.

C.4.1.5 By applying the IAQM guidance[58], impacts associated with construction dust can generally be mitigated to the point that impacts are negligible, or at worst minor, with the implementation of the correct mitigation.

C.5 MITIGATION

C.5.1 CONSTRUCTION

C.5.1.1 As part of the Proposed Development design process, it is expected and considered best practice to reduce the potential for impacts due to emissions of dust from construction activities in line with the IAQM Guidance document[59]. Adhering to this guidance in general makes it possible to render these impacts negligible, or at worst small.

[56] Data Archive - Defra, UK
[57] Construction-Dust-Guidance-Jan-2024.pdf
[58] Construction-Dust-Guidance-Jan-2024.pdf
[59] Construction-Dust-Guidance-Jan-2024.pdf

C.5.2 OPERATION AND MAINTENANCE

C.5.2.1 Operational impacts are expected to be negligible as no combustion activities are foreseen.

C.5.2.2 There is the possibility that a flare system will be installed on site. This flare system has not yet been designed. The system, as noted, will be sufficient to safely dispose of excess hydrogen, including avoiding unacceptable impacts on air quality. Most appropriate mitigation for emergency venting and flaring is limited to reducing the number of events which is inherent for this type of activity.

C.6 LIKELY SIGNIFICANT EFFECTS - EIA

C.6.1.1 **Table C.1** lists the likely significant effects for air quality.

TABLE C.1 - LIKELY SIGNIFICANT EFFECTS FOR AIR QUALITY

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Construction Dust, Construction works are associated with dust raising activities (earthworks, traffic on unpaved areas, construction works). This may have an effect on human and ecological receptors sensitive to dust and PM_{10}.	Embedded mitigation, for example as set out by the IAQM is designed to reduce impact levels to negligible or at worst minor impacts, considering distance to and sensitivity of receptors	Negligible or minor at most. Embedded mitigation, for example as set out by the IAQM, is designed to reduce impact levels to negligible or at worst minor impacts, considering distance to and sensitivity of receptors.	Scoped Out	None
Decommissioning activities will generally be the reverse of the construction sequence, involving similar types of equipment	Embedded mitigation, for example as set out by the IAQM, is designed to reduce impact levels to negligible or at worst minor impacts, considering distance to	Negligible or minor at most.	Scoped Out	None

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	and sensitivity of receptors			
Construction related traffic will be associated with emissions of dust and exhaust gases, which may affect human and ecological receptors	Due to the size of the project, the AADT is expected to be less than 200 heavy duty vehicles (HDV) during the construction phase; therefore, no embedded mitigation is required.	Not significant	Scoped Out	None
Decommissioning related traffic will be negligible	Due to the size of the project, the AADT is expected to be less than 200 heavy duty vehicles (HDV) during the decommissioning phase; therefore, no embedded mitigation is required.	Not significant	Scoped Out	None
Operational related traffic will be negligible	Due to the size of the project, the AADT is expected to be less than 200 heavy duty vehicles (HDV) during the operational and	Not significant	Scoped Out	None

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	maintenance phase; therefore, no embedded mitigation is required			
Operational Combustion Activities, Flaring or Venting	Optimise facility operations to reduce the need for routine flaring and Regular inspection of equipment to prevent unnecessary venting and flaring.	Minor	Scoped In	None

C.7 EFFECTS SCOPED OUT OF THE EIA

C.7.1.1 The following sections detail the impacts that have been scoped out of the assessment, together with the basis for doing so.

C.7.1.2 The construction and operational traffic associated with the proposed hydrogen storage facility has been scoped out of the AQIA due to its minimal anticipated impact on local air quality. In addition, it has been confirmed that the traffic associate with construction and operation will be the same as that reported in the Consented Development.

C.7.1.3 The projected traffic volume is expected to remain below regulatory screening thresholds, as outlined in DEFRA's Local Air Quality Management (LAQM) guidance. Additionally, the number of heavy-duty vehicles (HDVs) required for both construction and operation are not expected to be significant, minimizing potential emissions of NO_2 and PM.

C.7.1.4 It is assumed at this stage that no relevant emissions to the atmosphere will be associated with the operations of the Hydrogen Storage Facility, except the possibility of a flare or vent which will only be operated during emergency scenarios. Therefore, the operation of the Hydrogen Storage Facility will be scoped out of further assessment, however the flare and vent options will be scoped in.

C.8 PROPOSED APPROACH TO ASSESSMENT

C.8.1 BASELINE

C.8.1.1 Baseline air quality data (PM_{10} and if relevant NO_x/NO_2) will be sourced from national or local monitoring networks, and modelling undertaken by local authorities where available and from national modelling outputs (background mapping). No baseline surveys will be undertaken.

C.8.2 SPECIFIC METHODOLOGIES

C.8.2.1 The potential impacts for this topic are characterised on the basis of the potential harm to a receptor within a given source-pathway-receptor combination or pollutant linkage and graded with a level of magnitude.

C.8.2.2 Impacts from construction activities, will be assessed semi-quantitatively using the methodology described in the IAQM guidance[60].

C.8.3 ASSESSMENT CRITERIA

C.8.3.1 The assessment criteria to determine impacts from construction activities are described in the IAQM guidance[4]. The IAQM Construction Dust Guidance offers a structured approach to assess and mitigate dust emissions from construction activities, aiming to minimize their

[60] Construction-Dust-Guidance-Jan-2024.pdf

impact on air quality. The guidance includes a risk assessment process that evaluates factors such as the construction scale, proximity to sensitive receptors, and meteorological conditions to classify projects as low, medium, or high risk. It identifies key dust emission sources across four main phases—demolition, earthworks, construction, and trackout—each requiring specific mitigation measures. This will identify if any additional mitigation measures are to be included since the Consented Development and included within the CEMP.

C.9 SUMMARY AND CONCLUSIONS

C.9.1.1 A scoping exercise was carried for the ambient aspects of the Scoping Assessment. The scoping exercise includes:

- a summary of the relevant legislation, policy and guidance;
- a description of the main ambient air quality sources of the Proposed Development and mitigation options;
- a description of potentially significant ambient air quality effects during the construction operation and maintenance phases; and
- details of the approach to the ambient air quality assessment.

C.9.1.2 Construction and decommissioning dust have been scoped out for further assessment although a review will be undertaken to ensure existing mitigation measures are sufficient.

C.9.1.3 Construction and operational road traffic, and operational air quality have been scoped out.

C.9.1.4 Operational combustion activities, including flaring, have been included in the scope and will only occur during emergency situations or scheduled maintenance activities. This will be included in the PEIR should flaring be taken forward in the design.

APPENDIX D NOISE AND VIBRATION

D. NOISE AND VIBRATION

D.1 INTRODUCTION

D.1.1.1 This section addresses noise and vibration, providing a brief overview of existing conditions and the Proposed Development setting, identifies the effects to be considered in the EIA, and details the proposed approach to assessing the effects of the Proposed Development on sensitive receptors.

D.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

D.2.1.1 Key items of legislation, policy and guidance specifically relevant to noise and vibration for the Proposed Development are as follows:

Legislation

- Control of Pollution Act 1974 (CoPA)[61]
- Environmental Protection Act 1990 (EPA)[62]

National Policy and Guidance

- Overarching National Policy Statement for Energy (NPS EN-1)[63]
- National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (NPS EN-4)[64]
- National Policy Statement for Electricity Networks Infrastructure (NPS EN-5)[65]
- National Planning Policy Framework (NPPF)[66]
- Noise Policy statement for England 2010 (NPSE)[67]
- Planning Practice guidance – Noise (2019) (PPGN)[68]

Local Policy and guidance

- Cheshire West and Chester Council Local Plan (Part One) Strategic Policies[69]

[61] Control of Pollution Act 1974. *Legislation.gov.uk.* [Online] [Cited: November 26, 2024.] https://www.legislation.gov.uk/ukpga/1974/40.
[62] Environmental Protection Act 1990. *Legislation.gov.uk.* [Online] [Cited: November 26, 2024.] https://www.legislation.gov.uk/ukpga/1990/43/contents.
[63] Department for Energy Security & Net Zero. *Overarching National Policy Statement for Energy (EN1).* s.l. : Open Government Licence v3.0, 2023. ISBN 978-1-5286-4582-9.
[64] *National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN4).* s.l. : Crown copyright 2024, 2024. ISBN 978-1-5286-4585-0.
[65] *National Policy Statement for Electricity Networks and Infrastructure (EN-5).* s.l. : Open Government Licence v3.0, 2023. ISBN 978-1-5286-4586-7.
[66] Ministry of Housing, Communities & Local Government. *National Planning Policy Framework.* London : Crown Copyright 2024, 2024.
[67] Department for Environment, Food & and Rural Affairs. *Noise Policy Statement for England (NPSE).* London : Crown Copyright 2010, 2010.
[68] Ministry of Housing, Communities and Local Government. Planning Practice Guidance on Noise. *GOV.UK.* [Online] March 6, 2014. [Cited: November 26, 2024.] https://www.gov.uk/guidance/noise--2.
[69] Cheshire West & Chester Council. *Local Plan (Part One) Strategic Policies.* s.l. : Cheshire West & Chester Council, 2015.

- Cheshire West and Chester Council Local Plan (Part Two) Land Allocations and Detailed Policies[70]
- Cheshire East Local Plan Strategy 2010-2030[71]
- Cheshire East Environmental Protection Supplementary Planning Document[72]

Noise Assessment Standards and Guidance

- BS 5228-1:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1. Noise (BS 5228-1)[73]
- BS 5228-2:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2. Vibration (BS 5228-2)[74]
- BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142)[75]
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233)[76]
- ISO 9613-2:2024 Acoustics. Attenuation of sound during propagation outdoors - Engineering method for the prediction of sound pressure levels outdoors (ISO 9613)[77]
- Design Manual for Roads and Bridges – LA111 Noise and Vibration (DMRB)[78]
- Calculation of Road Traffic Noise (CoRTN)[79]

D.3 BASELINE ENVIRONMENT

D.3.1 STUDY AREA

D.3.1.1 The Proposed Development is within the administrative areas of Cheshire West and Chester Council, and adjacent to Cheshire East Council.

[70] Cheshire West & Chester Council. *Local Plan (Part Two) Land Allocations and Detailed Policies.* s.l. : Cheshire West & Chester Council, 2015.
[71] Cheshire East Council. *Local PLan Strategy 2010-2030.* Crewe : Cheshire East Council, 2017.
[72] Cheshire East Council. *Environmental Protection SPD.* s.l. : Cheshire East Council, 2024.
[73] British Standards Institution. *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise.* s.l. : BSI, 2014. ISBN 978 0 580 77749 3.
[74] British Standards Institution. *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration.* s.l. : BSI Standards Limited 2014, 2014. ISBN 978 0 580 77750 9.
[75] British Standards Institution. *BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.* s.l. : BSI, 2019. ISBN 978 0 539 02069 4.
[76] British Standards Institution. *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.* s.l. : BSI, 2014. ISBN 978 0 580 74378 8.
[77] International Organization for Standardization. *ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering Method for the prediction of sound pressure levels outdoors.* Geneva : ISO 2024, 2024.
[78] Highways England. *Design Manual for Roads and Bridges, LA 111 Noise and Vibration Revision 2.* London : Highways England, 2020.
[79] Department of Transport Welsh Office HMSO. *Calculation of Road Traffic Noise.* London : Crown Copyright 1988, 1988. ISBN 0 11 550847 3.

D.3.1.2 The Study Area will be determined based on the Proposed Development layout and the location of noise sources, as well as the location of construction / decommissioning activities. At this stage, for the baseline assessment for noise and vibration, the proposed Study Area includes the Scoping Boundary and a 2 km buffer from the Scoping Boundary. The final Study Area will be reviewed as part of the assessment in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

D.3.2 DATA SOURCES - SCOPING

D.3.2.1 Aerial imagery, electronic mapping data and publicly available documents relating to the consented Development have been used to identify receptors and existing noise sources likely to significantly contribute to the baseline acoustic environment.

D.3.3 DESCRIPTION

D.3.3.1 A robust assessment considers worst-case receptors close to areas of the Proposed Development that are anticipated to produce the highest levels of noise and vibration. If acceptable noise and vibration effects are anticipated at these 'worst-case' receptors then acceptable noise and vibration effects will also be achieved at those further away.

D.3.3.2 Approximately six locations with residential properties have been identified within the Scoping Boundary and seven within 500 m outside of the Scoping Boundary. These locations include those identified in the Consented Development application.

D.3.3.3 There are three villages within the Study Area (outside of the Scoping Boundary) which are : Middlewich (approximately 1.4 km to the south of the Scoping Boundary), Lach Dennis (approximately 1 km to the north of the Scoping Boundary), and Rudheath Woods (approximately 1.6 km to the east of the Scoping Boundary).

D.3.3.4 The baseline acoustic environment is expected to include road traffic noise from the existing road network, as well as other anthropologic sources such as farm machinery. Typical rural environmental noise sources, such as birds and wind in trees are also likely to contribute to the baseline acoustic environment.

D.3.4 KEY SENSITIVITIES

D.3.4.1 The key receptors considered in the assessment for noise and vibration (hereafter: 'noise-sensitive receptors', or 'NSRs') are nearby residential properties, schools and hospitals. It should be noted that noise and vibration effects non-human receptors (i.e., wildlife) will be covered in the ecology chapter.

D.4 BASIS OF ASSESSMENT

D.4.1 CONSTRUCTION

D.4.1.1 The amendments to the site infrastructure that will be assessed within the PEIR and ES are in relation to the key changes described in Chapter 2, Proposed Development Description, namely the size and location of the GPP (and associated equipment), the change in equipment at SMC3and the change in flowlines.

D.4.1.2 The methods that will be used to construct the wellheads and below ground infrastructure of the Proposed Development will be the same as the methods set out in the Consented Development in terms of construction and are therefore not considered further. There are also no anticipated material changes to the expected construction road traffic flows.

D.4.2 OPERATION AND MAINTENANCE

D.4.2.1 During operation, the main sources of noise will be from the equipment within the Hydrogen Storage Facility associated with the Hydrogen Storage Facility. This includes:

- operation of the Gas Processing Plant (GPP);
- substations; and
- rare use of the hydrogen vent / flare in the event of maintenance or emergency shutdown.

D.4.3 DECOMMISSIONING

D.4.3.1 The noise and vibration effects during the decommissioning phase are expected to be comparable to and not exceed that of the construction phase.

D.5 MITIGATION

D.5.1 CONSTRUCTION AND DECOMMISSIONING

D.5.1.1 Construction noise will be controlled, where practicable, following the guidance set out in BS 5228-1. This strategy is consistent with the strategy set out in the Consented Development.

D.5.1.2 The measures described in BS 5228-1 includes:

- control of noise at source, for example:
  - substitution of plant or activities with less noisy options;
  - modification of plant or equipment to reduce noise emissions;
  - the use of noise enclosures;
  - the siting of equipment and its method of use;
  - equipment maintenance;
  - controlling the spread of noise, e.g. by increasing the distance between plant and noise-sensitive receptors or by the provision of acoustic screening; and

- controlling working hours.

D.5.2 OPERATION AND MAINTENANCE

D.5.2.1 The Consented Development considered mitigation measures during operation, many of which are an inherent part of the Proposed Development design. Noise control mitigation measures included, placing loudest noise sources indoors, supplying low noise design equipment (e.g. fans that are externally mounted), adding silencers on air intakes / outlets and using acoustic screen or enclosure on major outdoor equipment.

D.5.2.2 The mitigation detailed in the Consented Development will be reviewed and revised as appropriate for the PEIR and ES. Further measures to be considered during the assessment and detailed design may include noise barriers and bunding, siting equipment, and buildings to provide screening, where practicable.

D.6 LIKELY SIGNIFICANT EFFECTS - EIA

D.6.1.1 **Table D.1** lists project activities of the Proposed Development with the potential to give rise to significant noise or vibration effects. The basis for scoping out an assessment of certain aspects is presented in Section D.7.

TABLE D.1 - EFFECTS – NOISE AND VIBRATION

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Noise and vibration from the construction and decommissioning of the site infrastructure (GPP, SMC3, Flowlines)	Practicable noise control measures following the guidance set out in BS 5228-1, and well as those set out for the Consented Development.	Minor	Scoped in – Change in site infrastructure locations and updates to equipment.	Day / night baseline measurements. Detailed information on equipment to be used during construction of site infrastructure, timings and work teams.
Noise and vibration from the construction and decommissioning of the wellheads and below ground infrastructure	Practicable noise control measures following the guidance set out in BS 5228-1, and well as those set out for the Consented Development.	No material changes to the noise and vibration effects from those predicted for the Consented Development.	Scoped out	-
Noise and vibration from construction and decommissioning road traffic	Practicable noise control measures following the guidance set out in BS 5228-1, and well as those set out for	No material changes to the noise and vibration effects from those predicted for the Consented Development. .	Scoped out	-

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	the Consented Development.			
Noise from operation of the facility.	Noise control measures such as choosing low noise versions equipment, use of acoustic enclosures, noise barriers and bunding, siting equipment and buildings so as to provide screening will be considered, where practicable.	Minor	Scoped in – Change in equipment during operation	Day / night baseline measurements. Detailed information on equipment to be used during operation.
Noise from operational road traffic	-	Not significant	Scoped out	-
Noise from operational vibration	-	Not significant	Scoped out	-

D.7 NOISE AND VIBRATION ASPECTS SCOPED OUT OF THE EIA

D.7.1.1 There are no anticipated material changes to the noise and vibration effects from the construction activities of the Proposed Development or construction road traffic. Therefore, construction noise and vibration effects have been scoped out.

D.7.1.2 No significant vibration generating equipment will be required during operation. Therefore, an operational vibration assessment is scoped out.

D.7.1.3 Significant increases in road traffic noise during operation are not expected to occur and are therefore scoped out of further assessment.

D.7.1.4 Measures that are applicable to the construction phase will also apply to the decommissioning stage. Decommissioning noise and vibration effects have therefore also been scoped out of further assessment.

D.8 PROPOSED APPROACH TO ASSESSMENT

D.8.1 BASELINE

D.8.1.1 A detailed knowledge of the baseline noise environment is required at the nearest NSRs. Baseline noise levels will be logged for a period of at least one week in accordance with BS 4142, along with meteorological data such as rain and wind speed and direction. Baseline noise measurement locations will be chosen in consultation with Cheshire West and Chester (CWAC) Council, to be representative of the typical noise environment at the nearest NSRs under assessment.

D.8.2 SPECIFIC METHODOLOGIES

D.8.2.1 Operational noise from the Proposed Development will be predicted using 3D computer noise modelling software (e.g., SoundPLAN) that implements the prediction method set out in ISO 9613. Construction noise will be predicted following the guidance set out in BS 5228-1.

D.8.3 ASSESSMENT CRITERIA

Operational Phase

D.8.3.2 The potential for significant noise effects will be assessed according to BS 4142. The assessment process is summarised below.

Initial Assessment

D.8.3.3 BS 4142 includes an assessment of the difference between the background sound level and the rating level at the receptor. This is referred to as the 'initial assessment'.

D.8.3.4 As described above, the rating level is equal to the specific sound level plus any adjustment for characteristic features of the sound. BS 4142 states that *"Certain acoustic features can increase the significance of*

impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."

D.8.3.5 The following acoustic features are described in the standard:

- tonality: up to a +6 dB penalty;
- impulsivity: up to a +9 dB penalty (if necessary, this can be summed with the tonality penalty);
- intermittency: a +3 dB penalty; and
- other sound characteristics (neither tonal nor impulsive but still distinctive): a +3 dB penalty.

Consideration of Context

D.8.3.6 Following the initial assessment, BS 4142 states that *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

D.8.3.7 Where the initial estimate of the impact needs to be modified due to the context, various pertinent factors need to be considered, including:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

D.8.3.8 **Table D.2** summarises the criteria for the magnitude and significance of potential effects as well as the Lowest Observed Adverse Effect Level and Significant Observed Adverse Effect Level values, as defined in the NPSE and PPGN.

TABLE D.2 - MAGNITUDE AND SIGNIFICANCE OF OPERATIONAL NOISE EFFECTS

Rating Level ($L_{Ar,Tr}$) compared to Representative background sound level (L_{A90}), dB	**BS 4142 Extract Regarding the Initial Assessment**	**Magnitude**	**Factors which may affect Significance (from BS 4142)**	**Significance of Noise**
<0	The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.	Negligible	Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including: • the absolute level of sound; • the character and level of the residual sound compared to the character and level of the specific sound; and • the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will	Not Significant
≥0 to <5		Small		
≥5 to <10	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.	Medium		Above LOAEL, but below SOAEL
≥10	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context	Large		Significant – above SOAEL

Rating Level ($L_{Ar,Tr}$) compared to Representative background sound level (L_{A90}), dB	BS 4142 Extract Regarding the Initial Assessment	Magnitude	Factors which may affect Significance (from BS 4142)	Significance of Noise
			already incorporate design measures that secure good internal and/or outdoor acoustic conditions.	

Notes:

[a] Rating Level, LAr,Tr according to BS 4142. The specific sound level corrected to allow for certain distinctive acoustic features.

[b] Background Sound Level according to BS 4142. The measured L90 level in the absence of the specific level.

D.9 SUMMARY AND CONCLUSIONS

D.9.1.1 This chapter includes the following in relation to noise and vibration:

- a summary of the relevant legislation, policy and guidance;
- a description of the main noise and vibration sources of the Proposed Development and mitigation options;
- a description of potentially significant noise and vibration effects during the construction operation and decommissioning phases; and
- details of the approach to the noise and vibration assessment.

D.9.1.2 The chapter identifies the following noise and vibration effects which have been scoped in for further assessment in the PEIR and ES:

- operational noise

D.9.1.3 The following noise and vibration effects have been scoped out of the assessment moving forward for PEIR and ES:

- construction noise;
- construction road traffic noise;
- construction vibration;
- operational road traffic noise; and
- decommissioning noise and vibration.

APPENDIX E TRAFFIC AND TRANSPORT

E. TRAFFIC AND TRANSPORT

E.1 INTRODUCTION

E.1.1.1 This chapter will focus, where applicable, on changes to the baseline environment and potential effects on traffic and transport risk as a result of the revised development (as described in **Chapter 2** of the Scoping Report).

E.1.1.2 An assessment of the effects of the Proposed Development on traffic and transport was undertaken in Chapter 12, Traffic and Transport of the Consented Development Environmental Statement. The assessment concluded that the construction of the Consented Development would result in a negligible impact on traffic and transport receptors within the Study Area and no mitigation would be required subject to a Heavy Good Vehicle (HGV) routing plan being implemented. The assessment further concluded that during the operation of the site, only a minimal number of staff will be required on the daily basis and therefore the effects of these movements on the highway network will be will also be negligible and was not further considered in the EIA.

E.1.1.3 This chapter has been prepared with reference to and should be read in conjunction with Chapter 12 of the Consented Development ES.

E.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

E.2.1.1 This scoping section has been prepared following the relevant guidance and published documents and considering applicable standards:

- Overarching National Policy Statement for Energy (EN-1) (2023)[80];
- National Planning policy Framework (NPPF) (2024)[81]; and
- Institute of Environmental Management and Assessment (IEMA), Guidelines for the Environment Assessment of Traffic and Movement (2023)[82].

E.3 BASELINE ENVIRONMENT

E.3.1 STUDY AREA

E.3.1.1 The Study Area for traffic and transport has been defined as the public road network in the vicinity of the Proposed Development which will

[80] Department for Energy Security and Net Zero (DESNZ), 2023. Overarching National Policy Statement for Energy (EN-1). [Online] Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1. (Accessed February 2025)
[81] Department for Levelling Up, Housing and Communities (2024). National Planning Policy Framework. [Online] Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 (Accessed: February 2025)
[82] Institute of Environmental Management and Assessment (2023) *Guidelines for the Environmental Assessment of Road Traffic and Movement.* [Online] Available at: https://www.thenbs.com/PublicationIndex/documents/details?Pub=IEA&DocID=257892 (Accessed February 2025)

most commonly be used for access by traffic generated by the Proposed Development as shown by **Figure 12.2** in **Chapter 12** of the Consented Development ES and remains unchanged. The road network identified within the Study Area is currently being used by construction traffic associated with the elements of the Proposed Development which are not under consideration of this MC application as set out in **Chapter 2, Proposed Development Description** of the Scoping Report.

E.3.2 DATA SOURCES - SCOPING

E.3.2.1 The following sources have been used to assess the baseline:

- Chapter 12: Traffic and Transport of the Consented Development ES;
- Department of Transport (DfT) Traffic Count Database Website[83] and
- Google Maps / Google Earth[84].

E.3.3 DESCRIPTION

E.3.3.1 The existing baseline conditions assessment remains unchanged as described in **Section 12.2.9** of **Chapter 12** of the Consented Development ES. Construction traffic associated with the Proposed Development would continue to follow the HGV Routing agreement secured t as part of the Consented Development. The primary access to the Proposed Development area is from the A530 King Street via a purpose-built priority junction constructed to the appropriate Industrial Estate standards and no upgrade is required.

E.3.3.2 The most recent manual traffic count data (2023) available from the DfT's online traffic count database on the A530 King Street in the vicinity of the site access increase indicates an average annual daily flow of 14,230 vehicles[85], which show minimal differences from previous manual counts (2000, 2003, 2005, 2007, 2008, 2010, 2019).

E.3.4 KEY SENSITIVITIES

E.3.4.1 The locations of the potentially sensitive receptors as shown on **Figure 12.3** of **Chapter 12** of the Consented Development ES remains unchanged.

E.4 MITIGATION

E.4.1.1 As outlined in **Chapter 1** of the Consented Development ES, an outline Construction Environmental Management Plan (CEMP) was submitted as part of the Consented Development ES[86].

[83] UK government, Department for Transport, Road Traffic Statistics. Available at Traffic Count Data Site. Accessed February 2025
[84] Available at: Google Earth Accessed February 2025
[85] https://roadtraffic.dft.gov.uk/manualcountpoints/47279. Accessed February 2025
[86] Keuper Gas Storage Project. Construction Environmental Management Plan. October 2015. Application Reference No. EN030002.

E.4.1.2 No specific mitigation for traffic and transport was identified as being necessary as there were no significant effects associated with the construction or operation of the Proposed Development. However, an HGV routing agreement, included with the CEMP, will be implemented to provide assurance that appropriate routing for HGV is secured.

E.5 LIKELY SIGNIFICANT EFFECTS - EIA

E.5.1 CONSTRUCTION

E.5.1.1 As set out in **Section 12.4.8** of **Chapter 12** of the Consented Development ES, the busiest period of construction traffic for HGVs was during the initial stages of each phase when site roads are being constructed. The peaks during these phases were years 1 and 3 when up to 30 HGVs per day are expected to access and egress the site, equating to 60 vehicle movements. In addition, there may be limited occasions where an additional 10 HGV per day will be required (such as during times of continuous concrete pour) on site. Therefore, the assessment was carried out on the basis of 40 HGVs (equating to 80 vehicle movements) as a 'worst case accessing the site.

E.5.1.2 It is acknowledged that details of the updated construction programme are unknown at this stage, however construction of the Consented Development began in 2021 with most of the site road entrances of the Consented Development completed. Other elements which are not being considered under this MC will continue to be discharged and constructed as per the arrangements under these consents.

E.5.1.3 On this basis, it is considered that the traffic generation of the Proposed Development is likely to be less or equal to the maximum daily HGV movements agreed as part of the Consented Development. Therefore, it is expected that the likely significant effects associated with the construction phase of the Proposed Development will be no worse that the environmental impacts associated with Consented Development (i.e. negligible) and the assessment of construction phase of Proposed Development is scoped out of the EIA assessment.

E.5.1.4 That notwithstanding, to sufficiently minimise any adverse effect on construction traffic, the Applicant would seek to ensure that the permitted Heavy Goods Vehicle movements shall not exceed the daily movement agreed as part of the Consented Development and is secured through an appropriately worded condition of consent.

E.5.2 OPERATION

E.5.2.1 As set out in the Consented Development, operational traffic movements are expected to be relatively small in number, with an operational workforce of 35 staff (over two or three shifts). A reasonable worst-case scenario for construction traffic, based on the peak flows, was assumed and the assessment concluded that the operational traffic was negligible and therefore was not considered further as part of the EIA.

E.5.2.2 There will be no changes to the operational traffic numbers and therefore it is not anticipated that there would be any effects that would be materially different to those described in the Consented Development. Therefore, operational traffic has been scoped out.

E.5.3 ABNORMAL INDIVISIBLE LOADS

E.5.3.1 It is currently not anticipated that the changes to the Proposed Development would require the need for abnormal load deliveries. As outlined in **Section 12.4.21** of **Chapter 12** of the Consented Development ES, should a need be identified for the movement of abnormal loads during construction, the routing of such movements would be discussed in advance with the relevant local highway authority and police to determine the most appropriate route, taking account of known network pinch points, general highway safety issues and weight / height restrictions. Such movements would ultimately be regulated under a local abnormal load licence, which would be secured in advance of any abnormal indivisible load deliveries to the Proposed Development.

E.6 SUMMARY AND CONCLUSIONS

E.6.1.1 Since the submission of the Consented Development, no change to the baseline conditions have been identified. The highway network in the vicinity of the Proposed Development used by traffic during the construction phase comprises A and B roads that connect to surrounding towns and the motorway network. As demonstrated in **Chapter 12** of the Consented Development ES, the maximum number of daily HGV (40 equating to 80 movements) predicted to access the site can comfortably be accommodated on the local highway network in terms of road and junction capacity impacts with no mitigation required

E.6.1.2 When compared to the Consented Development, it has been concluded that the proposed changes would result in the same total (or less) number of traffic movements through construction of the Proposed Development, with no change to the maximum daily number of movements during the peak period of construction anticipated. The Applicant is committed to maintain the agreed maximum daily movement and secured through an appropriately worded condition of consent.

E.6.1.3 In additional, there will be no material changes to the operational traffic numbers of the Proposed Development from the Consented Development.

E.6.1.4 Therefore, the assessed effect on routes is unchanged from the Consented Development. All traffic and transport effect will remain negligible and not significant and therefore the assessment of construction phase of the Proposed Development is scoped out of the EIA assessment.

APPENDIX F ECOLOGY AND NATURE CONSERVATION

F. ECOLOGY AND NATURE CONSERVATION

F.1 INTRODUCTION

F.1.1.1 This chapter identifies the potential impacts on ecology and nature conservation receptors of relevance to the Proposed Development and considers the potential effects from construction, operation, maintenance, and decommissioning activities.

F.1.1.2 This includes the analysis of desk study data, comprising an up-to-date species list from RECORD, the Local Environmental Records Centre for Cheshire, a review of previous surveys undertaken, and the ecological component of an EIA produced in 2014, informs a proposed list of surveys and respective methodologies which will determine the ecology scope for the PEIR and ES chapter.

F.1.1.3 The following paragraphs detail the information currently available relating to the Study Area baseline conditions, including relevant habitats, protected species, and ecological designations.

F.1.1.4 Details are also provided of likely significant effects for each ecological receptor, associated with the construction and operational phases of the Proposed Development.

F.2 REGULATORY REQUIREMENTS AND GUIDANCE

F.2.1.1 Key items of legislation, policy and guidance relevant to ecology for the Proposed Development are as follows:

- The EU Directive 92/42/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive);
- The EU Directive 2009/147/EC on the Conservation of Wild Birds (The Birds Directive);
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- Wildlife and Countryside Act 1981 (as amended);
- The Countryside and Rights of Way Act 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Protection of Badgers Act 1992;
- Hedgerow Regulations 1997;
- National Planning Policy Framework 2024;
- Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero, November 2023).

F.3 BASELINE ENVIRONMENT

F.3.1 STUDY AREA

F.3.1.1 The Study Area comprises the Scoping Boundary, and a zone of influence of at least 10km for European statutory designated sites (SACs and SPAs) 2km for UK statutory designated sites (SSSIs) and

2km for non-statutory designated sites. The Study Area for the protected species assessment currently incorporates the Scoping Boundary with a buffer of up to 500m outside the Scoping Boundary. This buffer varies and depends on the protected species in question; for example, the badger survey will extend into a buffer of 30m from the Scoping boundary. The extent of the buffer for great crested newt (GCN) is subject to the requirement for a full great crested newt survey effort; this approach is yet to be determined.

F.3.1.2 The majority of the Study Area consists of livestock-grazed modified grassland, typical of the surrounding flat, pastoral landscape of the Shropshire, Cheshire and Staffordshire Plain NCA. The Study Area is divided by a network of ditches and mature hedgerows, with numerous mature trees along field boundaries. Ponds are present in large numbers across the Study Area, also typical of the surrounding landscape, and occasional pockets of woodland; mostly associated with ponds or as linear plantations. A single watercourse, Puddinglake Brook, runs through the Study Area.

F.3.2 DATA SOURCES - SCOPING

F.3.2.1 The following list of data sources were reviewed for information relevant to the ecology for the Proposed Development:

- Keuper Gas Storage Project, Environmental Statement 2015 – Chapter 8 Ecology including the following annexed data reports:
- Ecology Annex A: Extended Phase 1 Habitat Survey Report (Peak Ecology, October 2014);
- Ecology Annex B: Extended Phase 1 Habitat Survey Map;
- Ecology Annex C: Great Crested Newt Survey Report (Peak Ecology, November 2014);
- Ecology Annex D: Ornithological Surveys 2014 (Peak Ecology, August 2014) and Addendum – Wintering Birds Surveys November-December 2014 (Peak Ecology, December 2014);
- Ecology Annex E: Local Biological Records Centre (RECORD) Results;
- Ecology Confidential Annex F: Badger and Barn Owl Survey Results;
- Ecology Annex G: Otter and Water Vole Survey Report (Peak Ecology, October 2014);
- Ecology Annex H: Bat Survey Report (Peak Ecology, December 2014);
- Ecology Annex I: Lesser Silver Water Beetle Survey Report (Peak Ecology, September 2014);
- RECORD (Cheshire Environmental Record Centre). Data purchase 2025. Data included protected and notable species, statutory and non-statutory sites within 2km of the Scoping Boundary
- www.magic.gov.uk (Website accessed February 2024)

- Kingdom Ecology 2018. Keuper Gas Storage Project Byley, Cheshire Great Crested Newt Surveys;
- Kingdom Ecology 2021. Keuper Underground Gas Storage Facility Hedgerow Survey;
- Kingdom Ecology 2021. Keuper Underground Gas Storage Facility Protected Species Assessment;
- Keuper Gas Storage Limited 2021. Biodiversity Management Plan; and
- Keuper Gas Storage Limited 2021. Landscape Management Plan.

F.3.3 DESIGNATED SITES

Statutory Designated Sites

F.3.3.1 No statutory designated sites for nature conservation are present on or adjacent to the Study Area. There are also no statutory sites within 2km of the Study Area; the nearest Statutory site is Plumley Lime Beds Site of Special Scientific Interest (SSSI), located approximately 4km north of the Study Area; designated for lowland calcareous grassland, lowland mixed deciduous woodland, wetlands and wet woodland.

F.3.3.2 A further 17 statutory sites are present within 10km of the Study Area; including two Local Nature Reserves (Brereton Heath, and Marshall's Arm Hartford), two Ramsar sites (Midland Meres & Mosses – Phase 1, and Midland Meres & Mosses – Phase 2), and one SAC (West Midland Mosses). Twelve additional Sites of Special Scientific Interest are also present.

F.3.3.3 The number and locations of statutory sites within a 10km search radius remains unchanged since the study for the Consented Development.

Non-Statutory Designated Sites

F.3.3.4 One Local Wildlife Site (LWS), a non-statutory designation, is present within the Study Area. This is Drakelow Gorse, the parcel of deciduous woodland located central to the Study Area. Woodland, pond and ditch habitats are listed under the designation. Drakelow Gorse has been designated as an LWS since the Consented Development.

F.3.3.5 An additional 17 non-statutory sites are present within 2km of the Site, all Local Wildlife Sites, typically designated for woodland, notable trees, grassland, or wildlife corridors. Six of these were designated prior to the assessment carried out for the Consented Development ES.

F.3.4 SCOPING SURVEYS

F.3.4.1 The following scoping surveys are being undertaken and will be used to inform the scope of the assessment in the ES:

- Winter Bird Surveys (January – March 2025, October – November 2025);
- Bat Preliminary Roost Assessment (February – March 2025);
- Great Crested Newt and Lesser Silver Water Beetle Habitat Suitability Assessment (March – April 2025;
- Great Crested Newt eDNA (if required under licencing approach) (April – June 2025);
- Badger Scoping Survey (April 2025);
- Breeding Bird Surveys (April – August 2025);
- Habitat Classification and Condition Assessment (April – September 2025);
- Riparian Mammal Scoping Survey (May and July 2025)

F.3.4.2 All new baseline survey data will be provided in an appendix to the ES.

F.4 BASIS OF ASSESSMENT

F.4.1 OVERVIEW

F.4.1.1 The assessment is based on the difference in scope between the Consented Development, and the proposed amendments for the material change outlined in **Chapter 2, Proposed Development Description** during the construction, operation and maintenance, and decommissioning phases. It also takes account of changes in legislation, policy, guidance, and established industry best practice since the Consented Development.

F.4.1.2 The assessment of effects section in the PEIR and ES will only report any new significant effects which the Proposed Development will have on ecological receptors. The significant effects to be assessed in the PEIR and ES will be informed by the results of the updated suite of ecology species surveys and any changes to the baseline.

F.4.1.3 If the significance of an ecological receptor has not changed since the Original ES for the Consented Development, it will not be assessed as part of the scope of assessment. However, if there are any indirect effects on ecological receptors e.g., from air quality and LVIA, these will be included in the PEIR and ES in the relevant chapter.

F.4.2 CONSTRUCTION

F.4.2.1 During construction, with mitigation (both new and existing from the Consented Development), the material changes to the Proposed Development described in **Chapter 2, Proposed Development Description** are unlikely to result in the direct disturbance of, and harm to, animals including the displacement of species from the proximity of the Proposed Development. This will be assessed further in the PEIR and ES.

F.4.3 OPERATION

F.4.3.1 The operation of the Hydrogen Storage Facility itself is unlikely to result in any new significant disturbance and displacement of species. However, if flaring is selected as the preferred option during emergency depressurisation and maintenance events, the indirect pollution effects on ecology from an air quality / LVIA (lighting) perspective will need to be assessed in the PEIR and ES.

F.5 MITIGATION

F.5.1.1 The Proposed Development shall incorporate all of the existing mitigation measures for ecology proposed in the Original ES, Outline CEMP and associated ecology management plans for the Consented Development. These will be cross-referenced and summarised in the PEIR and ES chapters e.g., buffers from watercourses, woodlands etc.

F.5.1.2 Aside from the mitigation above, any new site-specific mitigation measures for the Proposed Development will also be identified following the completion of the surveys, EcIA, updated CEMP and updated HRA (should this be deemed to be required). Mitigation required due to changes in policy will also be incorporated into the Proposed Development Design and Ecology chapter for the PEIR and ES.

F.6 LIKELY SIGNIFICANT EFFECTS – EIA

F.6.1.1 Due to the nature of the Proposed Development, the likely significant effects on ecology and nature conservation are difficult to predict at this stage. However, it is expected most significant effects will be limited to the construction phase.

F.6.1.2 Ecological surveys are currently ongoing (started January 2025) in the Study Area and the completion of surveys is expected December 2025. These surveys will be used to confirm whether the changes considered in the MC will lead to a materially different impact to ecological receptors.

F.6.1.3 The table below lists the likely significant effects relevant to ecology and nature conservation based on professional judgement and the design information available at this stage.

TABLE F.1 - LIKELY SIGNIFICANT EFFECTS - ECOLOGY AND NATURE CONSERVATION

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
Designated Sites	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	All statutory designations are at least 4 km from the Scoping Boundary and appear to be unchanged from the Consented Development. Further baseline information may be provided in the PEIR and ES however, designated sites are unlikely to require further detailed assessment.
Non-Designated Sites	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.		Scoped In	Drakelow Gorse LWS is a new non-designated site since the Consented Development which will need to be assessed. Although, before it was classified as a non-

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
				designated site, the effects on the Drakelow Gorse woodland, such as impacts on the root protection zone and noise disturbance to protected species, were previously considered within the DCO and remain unchanged. Updated surveys for protected species which may utilise the habitats within the LWS may highlight impacts; however, the qualifying features of the LWS are not expected to be subject to adverse effects as a result of the Material Change.
Bats	Described in the Ecology Annex H, Bat Survey Report in the Original ES for the	Assessed as 'not significant' in the Original ES for the	Scoped Out	Bat roosts may have changed on Site since assessed for the Consented

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
	Consented Development, Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Consented Development.		Development, due to damage or weathering of trees. Should the preliminary assessment identify such changes within trees to be removed or subject to disturbance during construction, these trees will be assessed further to confirm or rule out effects on roosting bats. Removal of trees where roosts of high conservation significance are present, if required, will result in significant effects. However, plentiful roosting opportunity is proposed to remain on Site. Therefore, effects are

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
				expected to be not significant. In addition, the suitability of the habitats on Site for foraging and commuting bats is unlikely to have changed significantly, therefore no effects are anticipated as a result of the Material Change. This will be confirmed post bat surveys.
Badgers	Described in the Confidential Ecology Annex F of the Original ES for the Consented Development, Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	Should the levels of badger activity across the Site remain unchanged; no effects are anticipated. If there are no changes to the location, extent, or active status of badger setts in the Study Area, they can be Scoped Out

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
	for the Consented Development.			of the assessment for the PEIR and ES.
Birds	Described in the Confidential Ecology Annex F of the Original ES for the Consented Development, Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped In	Vegetation removal, including hedgerows, trees and scrub, has the potential to impact upon individual birds if carried out during the breeding season; however, no significant effect on bird breeding populations is anticipated as a result of habitat loss. However, potential effects are likely as a result of any noise disturbance during construction or operation; this may act as an ongoing deterrent for breeding and passage bird activity. Therefore, birds have

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
				been Scoped In to the assessment.
Great Crested Newts	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped In	Due to changes in the design of the Proposed Development from the Consented Development, two ponds are proposed for removal. This may result in new effects on GCN including killing, injuring or disturbing individual newts during construction. GCN surveys will detail any changes in presence and distribution of GCN across the Site, and will inform the impact assessment of the pond removal and any other changes relating to

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
				habitat loss or disturbance. Terrestrial habitat loss for GCN is not expected to be significant; however, there is potential for disruption of habitat connectivity which may impact newt dispersal and success of individual meta-populations. Impacts as a result of traffic movement will also be considered; however, these impacts are unlikely to have changed under the Material Change.
Riparian Mammals	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	Should the scoping surveys identify no changes in presence of riparian mammals, no additional effects are

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
	HRA of the Original ES for the Consented Development.			considered likely during the construction or operational phase of the development, and these species may be scoped out of the assessment.
Lesser Silver Water Beetle	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	Likely scoped out if no species are present following the removal of the two GCN ponds. This species is confined to aquatic habitats; therefore, no effects are anticipated as a result of losses of terrestrial habitat and any such impacts will be scoped out.
Mud Snail	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	Likely scoped out if no species are present following the removal of the two GCN ponds. Impacts may be scoped

Receptor	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Material Change Assessment (Expected to be Scoped In or Out)	Justification
	HRA of the Original ES for the Consented Development.			out following habitat suitability assessments of ponds.
Reptiles	Described in the Outline CEMP, Chapter 8 of the Original ES for the Consented Development and the HRA of the Original ES for the Consented Development.	Assessed as 'not significant' in the Original ES for the Consented Development.	Scoped Out	Limited opportunities for Reptiles (as per the Consented Development). Unless any significant improvements in the suitability of habitats on Site are identified during the scoping surveys, no significant effects on reptiles are anticipated as a result of the Material Change.

F.7 PROPOSED APPROACH TO ASSESSMENT

F.7.1 BASELINE HABITAT SURVEY OF THE PROPOSED DEVELOPMENT SITE

F.7.1.1 All habitats on site will be assessed under the UK Habitat Classification. Habitat assessment will take place between April and September, to classify and map habitat types, formulate lists of botanical species present including invasive non-native species, and to carry out assessments of habitat condition.

F.7.1.2 Data will be gathered in a format to allow input into a Biodiversity Net Gain metric, in order to quantify impacts to the biodiversity value of each habitat type, and to identify areas of opportunity for enhancement.

F.7.2 PROPOSED SPECIES-SPECIFIC ASSESSMENT METHODOLOGY

Badgers

F.7.2.1 A walkover of the Study Area and a buffer of up to 30m from the Scoping Boundary will aim to identify any evidence of badger presence, with a focus on locations of setts and territories. This will aid to determine any potential impacts the Proposed Development may have on badgers, including potential destruction or disturbance of setts, or disruption or isolation of foraging habitats.

F.7.2.2 A thorough search for evidence of the presence of badgers will include: the identification of setts; evidence of discarded bedding; trodden paths between setts; latrines, often located close to setts, at territory boundaries or adjacent to favoured feeding areas; footprints; and badger hairs.

F.7.2.3 Survey methods will be based on the standard approach detailed in Surveying Badgers (Harris et al, 1989), as used during the National Badger Survey (Creswell et al, 1990).

Bats

F.7.2.4 Surveys have commenced in February 2025 to assess the suitability of trees on Site for roosting bats. All trees will be surveyed from ground-level to identify potential roost features; where trees are subject to removal or pruning works, or considered likely to be subject to vibration or noise disturbance, these will be surveyed further to ascertain presence or likely absence of bat roosts.

F.7.2.5 Night-time walkover surveys will also be carried out to monitor bat activity across the Study Area, and to identify potential impacts on foraging and commuting bats. These surveys will take place once per season from spring to autumn and will aim to record a representative sample of bat activity across the Study Area.

F.7.2.6 All survey methods will follow the industry standard guidance published by the Bat Conservation Trust (Collins (ed.) 2023).

Birds

F.7.2.7 Wintering bird transect surveys commenced in January 2025; these surveys are scheduled once per month in January, February, March, October, November and December. These surveys aim to map and describe how different bird species interact with the Study Area during winter, identifying any valuable individual habitats or areas of the Study Area for wintering birds, with a focus on presence of birds of conservation concern.

F.7.2.8 Breeding bird transect surveys will commence in April 2025; comprising up to six surveys between April and July, one of which will be undertaken at dusk. These surveys will be similar transects to those carried out during winter, with an aim to identify the species and numbers of birds using the Study Area, and their behaviour, during the breeding season. Valuable breeding habitats and behaviour of species of conservation concern will be monitored.

F.7.2.9 Survey methods will follow the industry standard bird survey guidelines, based on the national British Trust for Ornithology bird survey methodologies (Gilbert et al, 1998).

F.7.2.10 Pre-determined transect routes will be traversed at a steady pace, stopping at intervals to listen and look for birds. Birds will be identified by sight or sound; with their activity noted on field maps, using standard species and activity codes (Marchant, 1983).

F.7.2.11 Additional species-specific surveys may also be carried out (e.g. barn owl), should scoping surveys identify the requirement for such, based on habitat suitability.

Great Crested Newts

F.7.2.12 The initial survey effort for GCN will comprise habitat suitability index assessments of all waterbodies on site, following standard survey methodology (Oldham et al, 2000) to identify the potential of each waterbody to support GCN. Based on a standardised scoring system, each pond will be assessed against a series of criteria to produce an overall suitability score. Typically, ponds with higher HSI scores are more likely to support GCN. This alone does not determine whether a pond should be subject to be further survey but rather provides an indication of habitat suitability, to aid professional judgment on survey requirements, and is a useful tool for informing mitigation or enhancement proposals.

F.7.2.13 The subsequent approach to surveying great crested newts is yet to be confirmed and will depend on the licencing route to be taken. Under the District Level Licencing scheme, the survey scope and methodology required will be agreed with Natural England. Under an

application for a standard mitigation licence, a full suite of six survey visits will be required to facilitate a population size class assessment of all ponds where any GCN present may be impacted by the development.

Riparian Mammals

F.7.2.14 Water vole surveys will be carried out in accordance with the standard methodology (Dean et al, 2016), with two visits carried out; one in May and one in July. Habitats will initially be assessed for their suitability, based on physical features of the watercourse, dominant vegetation types and variation in water levels. All suitable habitats will be searched for evidence of water vole presence, including burrow holes, latrines, feeding stations, footprints and commuting paths.

F.7.2.15 All suitable otter habitat will be assessed in accordance with the methodology set out by Chanin (2003). This will include a systematic search of features likely to be used by otter such as bridges, culverts and prominent rocks within the channel to look for spraint, footprints, feeding remains, couches and holts. The otter survey will take place alongside the water vole survey.

Lesser Silver Water Beetle

F.7.2.16 A habitat suitability assessment for LSWB will be carried out alongside that for GCN and mud snail and will aim to identify characteristics of ponds that increase the likelihood of LSWB presence. This includes seasonally inundated areas including areas of ponds with shallow, open water; and, evidence of cattle poaching, detritus-rich pond substrate and presence of floating sweetgrass.

F.7.2.17 Where ponds are identified as suitable to support LSWB, these will be subject to further survey; comprising a methodical search for egg cocoons in the margins of ponds, where accessible.

F.7.2.18 Egg cocoon construction typically occurs in late spring; therefore, May and June are considered an appropriate survey window for detecting presence of cocoons.

Mud Snail

F.7.2.19 Survey effort for mud snail will initially comprise a habitat suitability assessment, alongside the GCN HSI survey, to assess suitability of waterbodies on site to support mud snail. Characteristics such as pond permanence, water quality, likely presence of other freshwater invertebrates and surrounding habitats will be recorded.

F.7.2.20 Focal ponds that will be impacted by the Proposed Development, either through direct loss, hydrological impacts or other habitat degradation, will be subject to further survey. Survey effort and methodology is yet to be confirmed; surveying typically comprises sampling using a hand net of the sediment around pond edges, and

visual checks for snails within marginal vegetation. Netting; however, poses a potential risk to LSWB egg cocoons, which may be present in similar waterbodies.

Reptiles

F.7.2.21 Survey effort for reptiles will initially comprise a walkover survey of the Study Area to identify suitable reptile habitat. Where suitable habitat is identified, and significant impacts to a reptile population are envisaged, a series of surveys will be carried out to confirm presence/likely absence and to determine the distribution and abundance of reptiles within a specified area.

F.7.2.22 Artificial refuges will be distributed across suitable habitat, with a period of monitoring carried out over seven visits between March and October; during which all artificial and natural refuges will be searched for presence of reptiles.

F.7.3 ASSESSMENT CRITERIA

Methodology

F.7.3.1 The approach taken for the assessment of ecological effects will follow the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland. These guidelines set out the following process for assessment:

- evaluation of the importance of features identified during the desk study and baseline surveys, with those considered to be Important Ecological Features (IEFs) scoped into the assessment, and those considered to be of local importance or not present scoped out;
- identification and characterisation of potential effects on IEFs;
- assessment of potential effects on IEFs, both from the Development alone and cumulatively with other developments in the surrounding area;
- identification of measures required to mitigate (avoid, minimise, reduce) adverse effects and to introduce possible enhancements; and
- assessment of the significance of any residual effects after mitigation.

F.7.3.2 The Ecology and Nature Conservation section will contain the ecological assessment and be supported by technical appendices detailing the desk study results, consultation, survey methodologies and results (including figures, tables, photographs, and maps).

Determining Value

F.7.3.3 The value of each habitat type will be assessed in relation to its suitability to support protected species; including potential breeding, foraging, commuting habitats, in relation to biodiversity conservation

objectives and policy, and in relation to the opportunity for restoration or enhancement in habitat condition.

Criteria for Impact Magnitude

F.7.3.4 The magnitude of impacts is topic-specific, with effects varying according to the species or habitat in question. Relevant survey and mitigation guidelines will be consulted in order to quantify the sensitivity of each receptor and subsequent impact magnitude.

F.7.3.5 The following criteria will be considered when identifying potential effects of the Proposed Development on ecological features:

- Scale or extent of the impact relative to the overall availability of suitable habitat or distribution of receptor;
- Timing and duration of impacts;
- Opportunity for mitigation measures.

Criteria for Impact Significance

F.7.3.6 Effects are considered significant when the impact supports or undermines the biodiversity conservation objectives for the relevant ecological features. This can be measured at varying scales, from site-level to national-level effects, and considers impacts on the structure and function of habitats and the conservation status of individual species.

F.8 SUMMARY AND CONCLUSIONS

F.8.1.1 The assessment of impacts will consider relevant effects upon European statutory designated sites within 10km of the Study Area, should the qualifying features or conservation objectives of such sites have changed since the Consented Development. Impacts upon non-statutory sites within 2km of the Study Area that have been designated since the Consented Development will also be considered.

F.8.1.2 All habitats on site will be mapped and categorised under the UK Habitat Classification, with condition assessments carried out in order to calculate a measurable change in habitat units as a result of the Proposed Development. This will also serve to identify areas of opportunity on Site for habitat enhancements.

F.8.1.3 Based on existing survey data available, the following protected species will likely be considered within the initial scoping surveys, with further species-specific surveys to be carried out where new potential impacts are envisaged as a result of the Material Changes;

- Bats;
- Badgers;
- Birds;
- Great crested newts;
- Riparian mammals;

- Lesser silver water beetles;
- Mud snails; and
- Reptiles.

F.8.1.4 Whilst the ecology surveys are being undertaken to review the baseline conditions for the Scoping Boundary since the Consented Development was prepared, the assessment of effects in the PEIR and ES chapter will only focus on likely significant impacts to designated, non-designated sites and species types as a result of the material changes. The assessment of all of the ecological receptors both of Significance and Non-Significance was completed for the Consented Development in Chapter 8 of the ES.

APPENDIX G LANDSCAPE AND VISUAL IMPACT ASSESSMENT

G. LANDSCAPE AND VISUAL IMPACT ASSESSMENT

G.1 INTRODUCTION

G.1.1.1 This section sets out the proposed methodology and approach to be applied in the Landscape and Visual Impact Assessment (LVIA). It presents the suggested scope of the LVIA in terms of those landscape and visual effects to be scoped in and scoped out of the assessment process. This is based on a preliminary assessment of the likely significant effects of the Proposed Development, and consideration of whether these effects would be materially different to the effects of the Consented Development.

G.1.1.2 The purpose of the LVIA is to identify and record the likely significant effects that the Proposed Development may have on physical elements of the landscape; landscape character; areas that have been designated for their scenic or landscape-related qualities; and views experienced by people at settlements, routes, hilltops and other sensitive locations. The potential cumulative effects that may arise from the addition of the Proposed Development to other large scale infrastructure developments are also considered.

G.1.1.3 The LVIA will consider the potential effects of the Proposed Development during the following development stages:

- Construction of the Proposed Development;
- Operation and maintenance of the Proposed Development; and
- Decommissioning of the Proposed Development.

G.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

G.2.1.1 Paragraph 187 of the National Planning Policy Framework (NPPF)[87] states that *"planning policies and decisions should contribute to and enhance the natural and local environment" by, amongst other things, "protecting and enhancing valued landscapes […] (in a manner commensurate with their statutory status or identified quality in the development plan)".*

G.2.1.2 The methodology for the LVIA is based on current best practice guidance, namely;

- Landscape Institute / Institute of Environmental Management and Assessment (2013), 'Guidelines for Landscape and Visual Impact Assessment', 3rd Edition ('GLVIA3')[88];
- Landscape Institute (2013), GLVIA3 Statement of Clarification 1 / 1385[89];

[87] Ministry of Housing, Communities and Local Government (published 2012, updated 2024) National Planning Policy Framework. Available online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2
[88] Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Routledge, London.
[89] The Landscape Institute (2015) GLVIA3 – Statements of Clarification. Available online at: https://www.landscapeinstitute.org/technical-resource/glvia3-clarifications/

- Landscape Institute (2019), 'Visual Representation of Development Proposals', Technical Guidance Note[90];
- Landscape Institute (2021), Technical Guidance Note 02 / 21 Assessing landscape value outside national designations[91];
- Natural England (2014) An Approach to Landscape Character Assessment[92].

G.3 BASELINE ENVIRONMENT

G.3.1 STUDY AREA

G.3.1.1 The LVIA Study Area is informed by the potential visibility of the Proposed Development in the surrounding landscape, and should be proportionate to the scale of the Proposed Development. Due to the limited height of the Proposed Development and the relatively flat nature of the surrounding landscape, in combination with the screening afforded by vegetation, it is unlikely that the lower elements of the Proposed Development would result in any landscape and visual impacts over large area. A single option for the vent stack or inclusion of an elevated / enclosed ground flare (would not exceed 50 m in height for both options) will be assessed, as this would be visible from a wider area, and has potential to affect views experienced by people at longer distances.

G.3.1.2 The Consented Development identified a Study Area of 2 km from the Site boundary. Due to the potential increased height of the proposed options for the vent stack or flare, this assessment will utilise a larger area for the examination of effects on landscape character and views / visual amenity. As a worst-case scenario, the LVIA Study Area will comprise:

- a 2 km radius from the Site boundary; combined with
- a 3 km radius around the vent stack or flare location.

G.3.1.3 The Study Area will be reviewed once a single option for venting or flaring has been confirmed.

G.3.1.4 It is judged that likely significant landscape and visual effects would not occur outside this area. The Study Area is shown on **Table G.1**, LVIA Study Area**.**

[90] The Landscape Institute (2019) Visual Representation of Development Proposals, Technical Guidance Note 06/19. Available online at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

[91] Landscape Institute (2021) Technical Guidance Note 02/21: Assessing landscape value outside national designations. Available online at https://www.landscapeinstitute.org/publication/tgn-02-21-assessing-landscape-value-outside-national-designations/

[92] Natural England (2014) An Approach to Landscape Character Assessment. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf

Scoping Boundary
LVIA Study Area
Viewpoint
Gas Processing Plant

Indicative LCA

1b Allostock - Cheshire West
4e Stublach - Cheshire East
5e East Winsford - Cheshire West
6a Rudheath - Cheshire East
10b Stublach Plain - Cheshire West
10c Lostock Plain - Cheshire West
10c Lower Dane - Cheshire East
10d Wimboldsley and Sproston Plain Chesire West
10e High Dane - Chesire East
13a Peover - Cheshire West
15e Dane Valley - Cheshire West

VP1
VP2
VP3
VP4
VP5
VP6

0 200 400 600 800 1,000
Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: MC
PROJECT: 0755727	CHECKED:
DATE: 21/03/2025	APPROVED:

Figure G.1
LVIA Study Area - Landscape Character Area and Proposed Landscape Viewpoints Material Change Amendment to the Keuper Gas Storage Project

ERM

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0755727 - Keuper Hydrogen\Map\0755727 - Keuper Hydrogen - Scoping Figures.aprx\0755727 - Keuper Hydrogen - SCO - LVIA Study Area - LCA and Proposed Landscape Viewpoints - A01

G.3.2 DATA SOURCES – SCOPING

G.3.2.1 The following data sources have informed this Scoping Report chapter:

- Natural England (2025) National Character Area Profiles[93];
- Cheshire West and Chester (CWAC) Local Plan (Part One) Strategic Policies (2015)[94];
- Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies (2019)[95];
- Cheshire West and Chester Landscape Strategy 2016[96];
- Cheshire East Landscape Character Assessment (2018)[97];
- OS mapping at 1:50,000 and 1:25,000;
- Aerial photography; and
- Google Earth, Street View and Maps.

G.3.3 DESCRIPTION

G.3.3.1 The changes in landscape and visual baseline of the Study Area, compared to those outlined in the Consented Development are described below. A full description of the baseline will be provided in the Preliminary Environmental Information Report (PEIR) and the Environmental Statement (ES).

LANDSCAPE CHARACTER

G.3.3.2 The Proposed Development falls within National Character Area (NCA): 61 - Shropshire, Cheshire and Staffordshire Plain. The baseline information related to this NCA remains the same as in the Consented Development.

G.3.3.3 Since the application for the consented Development was submitted, A Landscape Strategy for Cheshire West and Chester Borough (2016)[96] and The Cheshire East Landscape Character Assessment (2018) have replaced the Cheshire Landscape Character Assessment (2008), and have been outlined below. A full description of the landscape baseline will be provided in the PEIR and ES.

G.3.3.4 A Landscape Strategy for Cheshire West and Chester Borough (2016) divides the landscape of the district into 16 Landscape Character Types (LCTs), further refined into Landscape Character Areas (LCAs). The Proposed Development is located within LCT10 Cheshire Plain East and LCA10b Stublach Plain.

[93] Natural England (2025) National Landscape Character Areas. Available online: https://nationalcharacterareas.co.uk/
[94] Cheshire West and Chester Council (2015) Local Plan (Part One) Strategic Policies. Available online: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-one
[95] Cheshire West and Chester Council (2019) Local Plan (Part Two) Land Allocations and Detailed Policies. Available online: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-two
[96] Cheshire West and Chester Council (2016) A Landscape Strategy for Cheshire West and Chester Borough. Available online: https://www.cheshirewestandchester.gov.uk/residents/planning-and-building-control/total-environment/local-landscape-character-assessment-landscape-strategy-2016
[97] Cheshire East (2018) Cheshire East Landscape Character Assessment. Available online: https://www.cheshireeast.gov.uk/environment/heritage_natural_environment/landscape/development-effects-on-landscape-and-peoples-experience-of-landscape.aspx

G.3.3.5 The LCA is described as a *'flat pastoral plain influenced in part by features associated with the brine / salt extraction and gas storage industries. It is bounded to the west and south by the River Dane (LCA15e), to the north by the more industrialised Lostock Plain (LCA10c) and to the east by the healthy landscape of the Allostock Woodland, Heath, Meres and Mosses character area (LCA1b)'*[96].

G.3.3.6 A further five LCTs / LCAs are located within the Study Area, listed below:

- LCA10c Lostock Plain (LCT10 Cheshire Plain East);
- LCA15e Dane Valley (LCT15 River Valleys);
- LCA1b Allostock (LCT1 Woodland, Heaths, Meres and Mosses);
- LCA13a Peover (LCT13 Lowland Farmland and Mosses);
- LCA5e East Winsford (LCT5 Undulating Enclosed Farmland); and
- LCA10d Wimboldsley and Sproston Plain.

G.3.3.7 The southeastern part of the Study Area falls within Cheshire East. The Cheshire East Landscape Character Assessment (2018) divides the district into 14 LCTs, further refined into LCAs. The following LCAs are located within the Study Area:

- LCA4e Stublach (LCT4 Cheshire Plain East);
- LCA6a Rudheath (LCT6 Woodland, Heaths, Meres and Mosses);
- LCA10c Lower Dane (LCT10 River Valleys); and
- LCA10e High Dane (LCT10 River Valleys).

G.3.3.8 The boundaries of the local LCAs mentioned above will be used as the landscape reporting units for the LVIA.

LANDSCAPE DESIGNATIONS

G.3.3.9 Designations taken into consideration in the Consented Development remain relevant to this Material Change (MC). In addition, due to the proposed increase in the LVIA Study Area, the following designations fall within the proposed extended Study Area:

- Conservation Area at Bostock; and
- Various Grade II listed buildings, and Grade II* listed Bostock Hall.

G.3.3.10 These features may contribute to baseline landscape character, but effects on their heritage value are assessed in Technical Appendix H, Cultural Heritage.

VISUAL RECEPTORS AND VISUAL AMENITY

G.3.3.11 Visual effects would be experienced by the people who live and work in the area, together with those enjoying recreational activities in this area or simply passing through. Visual receptors are the people who would be affected by changes in views, and they are usually grouped by their activities at those places. This includes residents within settlements, users of the local transport network and Public Rights of Way (PRoW) as well as people visiting local areas of interest.

G.3.3.12 Visual receptors taken into consideration in the Consented Development remain relevant to this MC. In addition, due to the proposed increase in the LVIA Study Area, the following visual receptors fall within the extended Study Area:

- Residential receptors at Bostock Green and Bostock Hall;
- PRoWs, including the Dane Valley Way, to the east of the A533;
- London Road and Shipbrook Road; and
- Employment receptors within Gadbrook Park.

G.3.4 KEY SENSITIVITIES

G.3.4.1 At this stage, the key sensitivities are considered to be:

- Potential direct and indirect effects on local landscape character, particularly on LCA10b Stublach Plain;
- Views experienced by sensitive visual receptors, including people at nearby settlements, farmsteads and PRoW.

G.3.5 REPRESENTATIVE VIEWPOINTS

G.3.5.1 A desk based visual appraisal of the Site and its local environment was undertaken to inform the selection of viewpoints (VPs). The following representative viewpoints will be considered in the LVIA:

TABLE G.1 REPRESENTATIVE VIEWPOINTS

Viewpoint number	Viewpoint location	X, Y	Notes
VP1	View south from the junction of Penny's Lane and Crowder's Lane, Lach Dennis.	370340, 371972	Similar location to VP1 within Consented Development. Representative of people living in and moving around Lach Dennis and using the local road network.
VP2	View south from the Restricted Byway Rudheath RB7, near Drakelow Hall Farm.	370220, 370558	Similar location to VP3 within Consented Development. Representative of recreational receptors along the PRoW.
VP3	View north-east from Drakelow Lane, Byley.	371869, 369485	Similar location to VP9 within Consented Development. Representative of people living in and moving around Byley and using the local road network.
VP4	View north from Yatehouse Green.	370323, 368643	Similar location to VP13 within Consented Development. Representative of people living and moving around Yatehouse Green and along the local road network.
VP5	View north-east from King Street.	369530, 369610	Similar location to VP6 and VP12 within Consented Development. Representative of people travelling along the A530 (Roman Road) and living in farmsteads in this area.
VP6	View east from London Road, Bostock Green (located just outside Study Area but at best representative publicly accessible location).	366973, 369550	New viewpoint added. Representative of people living and moving around Bostock and Bostock Green and travelling along London Road.

G.3.5.2 Baseline photographic panoramas will be produced during Winter to represent the worst-case scenario for each viewpoint with minimal screening, illustrating the nature of existing views in the direction of the Proposed Development.

G.3.5.3 Visualisations of the Proposed Development from the viewpoints listed above will be produced.

G.4 BASIS OF ASSESSMENT

G.4.1 CONSTRUCTION

G.4.1.1 During construction, the following aspects of the Proposed Development may give rise to landscape and visual effects, that will be materially different to those outlined in the ES for the Consented Development:

- Construction activity associated with the vent stack or flare, including the presence of taller construction machinery such as cranes.

G.4.1.2 The following changes, although potentially impacting landscape and views during construction, are not anticipated to give rise to effects that would be materially different to those assessed in the ES for the Consented Development:

- Construction activity of the lower height infrastructure, associated with the change in configuration of the surface layout and design, including the Gas Processing Plant (GPP) and internal roads;
- Construction activity associated with the change in location of the High Voltage (HV) electrical infrastructure, including the 132kV pylon, from the GPP to the utility compound;
- Changes to the configuration of the temporary construction elements, including temporary laydown area, and construction cabins;
- Construction activity associated with the underground elements of the Proposed Development, associated with changes to the configuration of the pipelines; and
- Changes to the infrastructure of the consented compound known as Solution Mining Compound (SMC3).

G.4.1.3 During decommissioning it is anticipated that activity would be broadly similar or less than that of construction. Decommissioning effects will not be assessed separately.

G.4.2 OPERATION AND MAINTENANCE

G.4.2.1 During operation and maintenance, the following aspects of the Proposed Development may give rise to landscape and visual effects, that will be materially different to those outlined in the ES for the Consented Development:

- Presence of a vent stack or flare 15 m – 45 m tall located within the GPP; and

- Potential visible flaring of gas (if an elevated flare is selected as the preferred option) from the top of the vent stack.

G.4.2.2 The following changes, although potentially impacting landscape and views during operation and maintenance, are not anticipated to give rise to effects that would be materially different to those assessed in the ES for the Consented Development:

- Changes to the configuration of lower height infrastructure (typical height of between 10 m and 15 m) including within the GPP (excluding the vent stack) and internal roads.
- The change in location of the HV electrical infrastructure, including the 132kV pylon, from the GPP to the utility compound.
- Changes to the underground elements, including changes to the configuration of the pipelines.
- Changes to the infrastructure of SMC3.

G.5 MITIGATION

G.5.1.1 A review of the mitigation measures outlined in the Consented Development will be undertaken. As the changes to the Proposed Development (with the exception of the vent stack or flare) are not deemed to be materially different from an LVIA perspective, it is anticipated that no changes to the mitigation planting proposed in the Consented Development would be necessary, and no further mitigation or enhancement would be required.

G.5.1.2 Due to the height of the proposed vent stack or flare, mitigation planting would likely not benefit landscape and visual receptors. Embedded design mitigation will ensure that the vent stack or flare will be designed to be the minimum dimensions possible, and materials and colours will be selected to reduce visual intrusion. Any visible flaring will be kept to the minimum required. No lighting will be installed on the vent stack or flare.

G.6 LIKELY SIGNIFICANT EFFECTS - EIA

G.6.1.1 The table below lists the new likely significant effects for LVIA.

TABLE G.2 LIKELY SIGNIFICANT EFFECTS

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Construction of surface infrastructure	Existing landscape proposals and construction mitigation set out within the Consented Development	Effects likely to be materially different to those identified in the Consented Development would be limited to those associated with construction of the vent stack or flare. The effects would be short duration, temporary in nature.	Scoped In (effects associated with the proposed vent stack or flare arrangement) Scoped out (all other construction activity associated with the Proposed Development)	Viewpoint Photography to be taken at agreed locations.
Construction of underground infrastructure, including pipelines and caverns	Existing landscape proposals within the Consented Development	Effects are not likely to be materially different from those assessed within the Consented Development. The effects would be short duration, temporary in nature.	Scoped out.	N / A
Operation and maintenance of Proposed Development	Existing landscape proposals within the Consented Development	Effects likely to be materially different to those identified in the Consented Development would be limited to those	Scoped In (vent stack and night-time effects associated with flaring).	Viewpoint Photography to be taken at agreed locations.

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
		associated within the presence of the vent stack or flare arrangement. The Proposed Development would have permanent effects on the landscape and the vent stack (and associated flaring) would be visible across a relatively long-distance.	Scoped out (all other elements of the Proposed Development).	ZTV to be produced based on vent stack.
Decommissioning of the Proposed Development	No specific mitigation measures proposed	The effects of decommissioning phase would be of short duration and broadly the reverse of the construction sequence. As such, effects are expected to be similar to, but not greater than, those expected during construction.	Scoped in. Decommissioning effects will be similar to construction stage, and will not be assessed separately.	N / A

G.7 EFFECTS SCOPED OUT OF THE EIA

G.7.1.1 The following sections detail the impacts that have been scoped out of the assessment, together with the basis for doing so.

G.7.1.2 Construction, decommissioning and operational effects associated with the change in configuration of the surface layout and design, including the GPP, internal roads, HV electrical infrastructure, temporary construction elements, including drilling riggs, and the underground elements, including pipelines. These changes are not determined to materially change the effects on landscape and visual receptors as the scale and location of the elements are not dissimilar to those assessed in the Consented Development.

G.7.1.3 The changes to the infrastructure of SMC3, would likely reduce effects in this location and these changes are therefore proposed to be scoped out of the LVIA.

G.7.1.4 Effects on LCAs and visual receptors located beyond the proposed Study Area (2 km from the Site boundary and 3 km from the GPP) are proposed to be scoped out.

G.7.1.5 Effects on the NCA are proposed to be scoped out of the ES due to its very large scale, however effects on local LCAs, as described in section 12.3, will be assessed.

G.8 PROPOSED APPROACH TO ASSESSMENT

G.8.1 SPECIFIC METHODOLOGIES

G.8.1.1 The two components of LVIA are based on the following definitions:

- "*Assessment of landscape effects: assessing effects on the landscape as a resource in its own right*"[88]; and
- *"Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people."*[88]

G.8.1.2 The Proposed Development may have a direct (physical) effect on the landscape in which it is located as well as a perceived effect from landscape character areas surrounding it. The potential landscape effects, occurring during the installation and operation of the Proposed Development may therefore include, but are not restricted to, the following:

- Changes to landscape elements: the addition / revision of new elements and other characteristic elements of the landscape character type.
- Changes to landscape qualities: degradation, erosion, or reinforcement of landscape elements and patterns, and perceptual characteristics, particularly those that form key characteristic elements of landscape character types.
- Changes to landscape character: landscape character may be affected through the effect on characteristic elements (including perceptual characteristics), landscape patterns and attributes and

the cumulative addition of new features, the magnitude and presence of which is sufficient to alter a notable part of the overall landscape character type of a particular area.

- Cumulative landscape effects: where more than one development may lead to a potential landscape effect.

G.8.1.3 Visual effects are concerned wholly with the effect of development on visual receptors and general visual amenity. Visual effects are identified for different receptors (people) who would experience the view such as at their places of residence, during recreational activities, at work, or when travelling through the area. Visual effects may include the following:

- Visual effect: change in the appearance of the landscape as a result of development. This may include changes to the quality of the view, ability of the visual receptor to appreciate the view, or changes to the characteristic elements within the view. These changes can be beneficial (i.e. an improvement) or adverse (i.e. a detraction).
- Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

G.8.1.4 The visual assessment will draw from the Zone of Theoretical Visibility (ZTV), site visits and viewpoint analysis and assesses the potential visual effects on views and visual amenity likely to be experienced by receptors (people) within the landscape as follows:

- Views from residential properties and settlements;
- Views from valued landscapes;
- Views experienced while travelling through the landscape (recreational road users, walkers, horse riders, cyclists for example); and
- Views from tourist and recreational destinations.

G.8.2 VISUALISATIONS

G.8.2.1 Visualisations to reflect the maximum likely parameters of the Proposed Development, including the proposed location of the vent stack or flaring arrangement in each view, would be produced to support the LVIA. These visualisations will be used to assess potential visual effects. No night-time visualisations are proposed.

G.8.3 CUMULATIVE ASSESSMENT

G.8.3.1 In addition to assessing the Proposed Development as a standalone scheme, the LVIA will also consider the potential additional effects on landscape character and visual amenity of the Proposed Development in conjunction with other planned infrastructure development in the vicinity.

G.8.3.2 An assessment of the cumulative effects with existing infrastructure development will be undertaken in line with GLVIA3, and according to the following definition.

G.8.3.3 Cumulative effects are defined as arising from *"additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future."*[88]

G.8.4 ASSESSMENT CRITERIA

G.8.4.1 The level of landscape and visual effect (and whether this is significant) is determined through consideration of:

- the 'sensitivity' of the landscape and visual receptors, combining professional judgements on susceptibility and value, using the principles set out in GLVIA3; and
- the 'magnitude of change' posed by the Proposed Development, taking into account a combination of judgements including scale, geographical extent, duration and reversibility (as defined within GLVIA3).

G.8.4.2 The process involves design and re-assessment of any remaining, residual significant adverse effects that could not otherwise be mitigated or 'designed out'. Landscape or visual sensitivity is ranked from high, medium to low and the magnitude of change is similarly ranked from large, medium, small to barely perceptible. The type of effect is also considered and may be direct or indirect, temporary or permanent, cumulative, and beneficial, neutral or adverse.

G.8.4.3 The landscape and visual assessment involves a combination of both quantitative and subjective assessment and wherever possible will seek to gain a consensus of professional opinion through consultation, peer review and the adoption of a systematic, impartial, and professional approach.

G.8.4.4 In accordance with EIA Regulations, it is essential to determine whether the predicted effects are likely to be 'significant'. Significant landscape and visual effects, in the assessor's opinion, resulting from the Proposed Development would be all those effects that normally result in a 'major', a 'moderate – major', or 'moderate' effect with any exceptions being clearly explained.

G.9 SUMMARY AND CONCLUSIONS

G.9.1.1 Some of the changes to the Proposed Development, when compared to the Consented Development, have potential to result in new or different significant effects at construction and decommissioning stages, on landscape and visual receptors within the Study Area.

G.9.1.2 Effects during Operation and Maintenance would only be as a result of the introduction of an (up to) 50 m tall vent stack or flaring arrangement and associated flaring. Other changes to the Proposed

Development during Operation and Maintenance are not likely to result in effects that are materially different to those assessed in the Consented Development, and are proposed be scoped out (see **Table G.2** above).

G.9.1.3 The 2 km Study Area identified in the Consented Development is proposed to be increased to 3 km from the GPP (and 2 km from the Site boundary) to take into account the increased height within the Proposed Development, introduced by the vent stack or flaring arrangement. This will be refined during the PEIR and ES once a single option has been identified for assessment.

G.9.1.4 Landscape and visual receptors have been identified and effects on these receptors will be assessed. The assessment will be informed by visualisations for six representative viewpoints. The assessment will be undertaken in line with the principles set out in GLVIA3.

APPENDIX H CULTURAL HERITAGE

H. CULTURAL HERITAGE

H.1 INTRODUCTION

H.1.1.1 This chapter outlines the scope of the cultural heritage assessment for the Proposed Development and considers the potential effects on cultural heritage during the construction, operation, maintenance, and decommissioning phases of the Proposed Development.

H.1.1.2 This chapter provides an overview of the preliminary cultural heritage baseline conditions in the Scoping Boundary and Study Area, identifies potential heritage effects to be considered and any mitigation measures that may be implemented.

H.2 CULTURAL HERITAGE REGULATORY REQUIREMENTS AND GUIDANCE

H.2.1.1 The scope of the cultural heritage assessment section of the EIA has been developed in line with the following key legislation, policy and guidance:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) Act 1990;
- Hedgerows Regulations 1997;
- National Planning Policy Statements for Energy Infrastructure 2024 (EN-3)[98] and (EN-4[99]);
- National Planning Policy Framework (Section 16 - Conserving and Enhancing the Historic Environment) (2024)[100];
- Planning Practice Guidance (PPG) – Historic Environment (July 2019);
- Countryside Hedgerow Protection Guidance – Removing Hedgerows (September 2024)[101];
- The Cheshire West and Chester Local Plan[102]

[98] UK Government (2024) National Policy Statement for Renewable Energy Infrastructure (EN-3) (Online) https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf Accessed: January 2025.
[99] UK Government (2024) National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Online) https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf Accessed: January 2025.
[100] UK Government (2024) National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf Accessed: January 2025.
[101] UK Government (2002) Hedgerow Regulations 2002 (As Amended). Available at:https://www.gov.uk/guidance/countryside-hedgerows-regulation-and-management Accessed: January 2025.
[102] Cheshire West and Chester Council (2015) Cheshire West and Chester Local Plan (Part One) Strategic Policies. Available at: https://consult.cheshirewestandchester.gov.uk/kse/event/24907 Accessed February 2025.

- Chartered Institute for Archaeologists (CIfA) guidelines: Standard and guidance for archaeological desk-based assessment (Revised 2020)[103]
- Chartered Institute for Archaeologists (CIfA) (2014) Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment[104];
- English Heritage (2008) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment[105];
- Historic England (2015) Historic Environment Good Practice Advice In Planning Note 2: Managing Significance In Decision-Taking In The Historic Environment[106];Historic England (revised 2017) Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets[107];
- Historic England (2016) Preserving Archaeological Remains Decision-taking for Sites under Development[108]; and
- IMEA (2021) Principles of Cultural Heritage Impact Assessment in the UK[109].

H.3 BASELINE ENVIRONMENT

H.3.1 STUDY AREA

H.3.1.1 Two search areas have been defined to identify the historic landscape context and to assess the effect that the Proposed Development may have upon its surrounding cultural heritage. These are the:

- Scoping Boundary
- Study Area (Scoping Boundary plus 250m)

H.3.1.2 Any other assets located beyond these search areas that are considered relevant to establishing the Scoping Boundary's historic

[103] Chartered Institute for Archaeologists (revised 2020). *Standard and guidance for historic environment desk-based assessment, updated 2020.* Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf Accessed: January 2025.
[104] Chartered Institute for Archaeologists (2014) *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*. Available at: https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf Accessed: January 2025
[105] English Heritage (2008) *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment*. Available at: https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/ Accessed: January 2025
[106] Natural England (2015). *Managing Significance in Decision-Taking in the Historic Environment*. Available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/
[107] Natural England (2017). The Setting of Heritage Assets. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/
[108] Historic England (2016) *Preserving Archaeological Remains Decision-taking for Sites under Development* [Online] https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/heag100a-preserving-archaeological-remains/ Accessed: January 2025.
[109] IMEA (2021) Principles of Cultural Heritage Impact Assessment in the UK (Online) https://files.clickdimensions.com/iemanet-ay0iq/files/j30361_iema_principlesofchia_v8.pdf?1626095514392 Accessed: January 2025.

landscape context or that are identified as potentially susceptible to impact, will also be considered.

H.3.2 DATA SOURCES - SCOPING

H.3.2.1 This scoping report is based on a review of existing information found in previous reports and readily available online sources. These include:

- Modern and historical maps of the study area, including tithe maps (1836-51) and OS series maps, including the First Edition (1891).
- English Heritage (National Monuments Record) for information on World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Historic Parks and Gardens, and Historic Battlefields.
- Online sources including MAGIC (Defra website), English Heritage's database of designated historic assets, the Cheshire Archives and Local Studies website and Google Earth for aerial photography.
- Keuper Gas Storage Project Environmental Statement (2015).

H.3.3 DESCRIPTION

Overview

H.3.3.2 The described baseline environment for cultural heritage for the Proposed Development is unchanged from the Consented Development. This is presented in the ES for the Consented Development and includes detail on Landscape Context and Historic Attributes, Designated Assets, Non-Designated Assets, Cartographic Evidence, National Character Areas, findings from fieldwork. Further detail is also provided on the baseline in Cultural Heritage Annex A, Desk-Based Assessment in the ES for the Consented Development.

H.3.3.3 However, since the Consented Development ES, there have been updates on guidance and best practice. Therefore, geophysical surveys will be undertaken to inform the baseline for the PEIR and ES and a full description of the baseline will be given in both.

H.3.4 KEY SENSITIVITIES

H.3.4.1 Aspects of the historic environment which will be most vulnerable to impacts from the Proposed Development are as follows:

- Archaeological features, artefacts and deposits: the Proposed Development will be located within a known archaeological landscape, which could be vulnerable to physical disturbance. In particular, there is potential for currently unknown Roman and medieval buried archaeology to survive within the Scoping Boundary associated with King Street and Drakelow Hall respectively.
- Cultural heritage assets within the Study Area: the Proposed Development will be located within a known heritage landscape,

where there are known assets whose settings could be vulnerable to impact. This includes three assets identified in the Consented Development: Rosebank House (1310621), Drakelow Hall (1020100), and RAF Cranage (1020762).

H.4 BASIS OF ASSESSMENT

H.4.1.1 The Scoping Boundary is approximately 454 ha and will contain the proposed infrastructure associated with solution mining and gas storage as part of the Proposed Development. It should be noted that the proportion of physical works in the Scoping Boundary is low compared with the overall area.

H.4.1.2 The construction, operation, and decommission of the Proposed Development is likely to introduce new and different effects to cultural heritage through direct and indirect impacts. Changes to layout, additional infrastructure, and Proposed Development components that are no longer being carried forward are described in full within **Chapter 2 Proposed Development Description** and shown in **Figure 2.1**.

H.4.1.3 For cultural heritage, a direct impact refers to any physical alteration of a heritage asset resulting directly from the Proposed Development.

H.4.1.4 Direct impacts are most likely to occur during groundworks associated with construction of the GPP, wellheads, substations, and other above ground installations. The possible direct impacts on cultural heritage assets are as follows:

- Impacts on five sections of historic hedgerows and four areas of ridge and furrow due to the layout changes for the wellheads, access tracks and pipelines; and
- Impacts on buried archaeology due to the expansion of the GPP area, and changes in pipelines and access tracks.

H.4.1.5 The ES for the Proposed Development shall assess these direct impacts and identify any new direct impacts as a result of the changes in groundworks for the construction of the GPP, wellheads, substations, and other above ground installations described in **Chapter 2, Proposed Development Description.**

H.4.1.6 An indirect impact refers to any change in the baseline condition of a heritage asset resulting beyond the Scoping Boundary. Most commonly, indirect impacts involve changes to the setting of heritage sites (considering changes such as visual intrusion and noise pollution), though other changes such as the generation of dust and vibration and changes in water table, can have an impact beyond the Scoping Boundary. Activities associated with the Proposed Development likely to have an indirect impact on heritage assets include the construction, operation, and decommission of the above

ground installations and associated infrastructure. The possible indirect impacts on cultural heritage assets are as follows:

- Impacts on the setting of the Scheduled Monument Drakelow Hall Moated Site due to the expansion of the GPP and therefore closer proximity to the scheduled monument; and
- Impacts on the setting of the World War II defences of the former airfield of RAF Cranage Scheduled Monument due to slight amendments to the layout of the pipelines.

H.4.1.7 In terms of potential indirect impacts to settings, no further assessment of this part of the Proposed Development will be required.

H.4.2 POTENTIAL EFFECTS

H.4.2.1 Significant effects on cultural heritage that may occur from the Proposed Development are likely to include:

- Ground disturbance during construction phase causing potential loss of whole or part of a buried archaeological site. If construction activities are unmitigated, it could potentially result in a significant effect.
- Impacts during construction, operation and decommissioning phases on the setting of cultural heritage sites and landscapes.

H.4.3 CONSTRUCTION

H.4.3.1 The construction phase of the Proposed Development may cause the following impacts upon cultural heritage assets within the Study Area:

- Ground disturbance during construction phase causing potential loss of whole or part of a buried archaeological site.
- Impact upon the setting of cultural heritage assets during the construction phase of the Proposed Development. This includes visual and audio intrusions or changes to the wider historic landscape that may detract value from the cultural heritage assets.

H.4.4 OPERATION

H.4.4.1 The operation phase of the Proposed Development may impact upon the setting of heritage assets within the Study Area. This includes visual, dust and noise intrusions or changes to the wider historic landscape due to above-ground elements that may detract value from heritage assets.

H.4.5 DECOMMISSIONING

H.4.5.1 Decommissioning will involve the use of similar equipment to the construction phase which may introduce temporary noise, dust and visual changes to the environment that have the potential to affect the

settings of heritage assets. Decommissioning groundworks will be restricted to the same areas as construction phase groundworks and will therefore not introduce any further impacts on buried archaeology that may have been located there. Therefore, it is proposed that decommissioning of groundworks is scoped out of the cultural heritage and archaeology assessment of the ES.

H.5 MITIGATION

H.5.1.1 Following guidance provided by Historic England, impacts on the historic environment will be avoided in the first instance. If avoidance is not proportionate or possible, and a direct impact is predicted, then recording and investigations to capture evidence from the historic environment would be conducted, and the information gathered made available to the public.[110] If avoidance is not proportionate or possible, and an indirect impact on the setting of the historic environment is predicted, then practical measures to reduce the impact will be developed, following specific guidance provided by Historic England.[111]

H.5.1.2 Specific mitigation measures may include :

- An investigation and survey to develop a robust historic environment baseline considered for impact assessment.
- Input into design process to maximise the avoidance of known features.
- The development of written schemes of investigation for the construction phase (in consultation with Cheshire Archaeology Planning Advisory Service (CAPAS) heritage officer) to record and report assets that cannot be avoided.
- The development of procedures for construction to be implemented in the event of chance finds.
- Landscaping to screen above ground elements of the Proposed Development, including tree planting.

H.6 LIKELY SIGNIFICANT EFFECTS - EIA

H.6.1.1 The table below lists the likely significant effects for cultural heritage.

[110] Historic England (2016) Preserving Archaeological Remains Decision-taking for Sites under Development.
[111] Historic England (revised 2017) Historic Environment Good Practice Advice in Planning Note 3

TABLE H.1 - LIKELY SIGNIFICANT EFFECTS

Proposed Development Activity	Expected Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Ground disturbance during construction phase causing potential loss of whole or part of a buried archaeological site. (Geophysical surveys to determine impact assessment).	• Geophysical survey to develop a robust historic environment baseline considered for impact assessment. • Input to design process to maximise the avoidance of known features including any additional buried archaeology located in the vicinity of Drakelow Hall Scheduled Monument and to the South of King Street from geophysical survey. • If necessary, develop written schemes of investigation for the construction phase (in consultation with CAPAS's heritage officer) to record and report assets that cannot be avoided. • Develop procedures for construction to be implemented in the event of chance finds.	Minor	Scoped In	Geophysical survey

Proposed Development Activity	Expected Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Impacts during construction, operation and decommissioning phases on the setting of heritage sites and landscapes	Bunds and tree planting. Input to design to minimise impacts upon the setting of heritage assets.	Minor	Scoped In	N/A

H.7 PROPOSED APPROACH TO ASSESSMENT

H.7.1 BASELINE DATA GATHERING

H.7.1.1 This assessment will consist of a multi-staged and iterative approach to baseline data gathering, including an updated desk-based assessment and a geophysical survey to assist in identifying potential buried archaeology. The results of the updated desk-based assessment and geophysical survey will be discussed with CAPAS and a decision taken as to whether further baseline surveys, that may include intrusive investigations, are required.

H.7.2 ASSESSMENT OF HERITAGE SIGNIFICANCE

H.7.2.1 Heritage assets will be assessed in terms of their significance, following the requirement in EN-1 section 5.9.10, and taking account of Historic England's guidance on 'Managing Significance in Decision-Taking in the Historic Environment' (GPA2).

H.7.2.2 Significance, in relation to heritage policy, is defined in the NPPF as *"the value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting."*

H.7.2.3 The NPPF glossary and the PPG provide that an asset's significance derives from its heritage 'interests', which the latter defines as follows:

- Archaeological interest: "As defined in the Glossary to the National Planning Policy Framework, there will be archaeological interest in a heritage asset if it holds, or potentially holds, evidence of past human activity worthy of expert investigation at some point".
- Architectural and artistic interest: "These are interests in the design and general aesthetics of a place. They can arise from conscious design or fortuitously from the way the heritage asset has evolved. More specifically, architectural interest is an interest in the art or science of the design, construction, craftsmanship and decoration of buildings and structures of all types. Artistic interest is an interest in other human creative skills, like sculpture."
- Historic interest: "An interest in past lives and events (including pre-historic). Heritage assets can illustrate or be associated with them. Heritage assets with historic interest not only provide a material record of our nation's history but can also provide meaning for communities derived from their collective experience of a place and can symbolise wider values such as faith and cultural identity."

H.7.2.4 Historic England's 'Statements of Heritage Significance: Analysing Significance in Heritage Assets', Historic England Advice Note 12 (2019), also promotes the use of this terminology and methodology.

This approach allows for a detailed and justifiable determination of heritage significance and the interests from which that significance derives.

H.7.2.5 In accordance with EN-1, the level of significance attributed to heritage assets will be articulated as follows:

- **Designated heritage assets of the highest significance**, as identified in Section 5.9.30 of EN-1, comprising Grade I and II* Listed buildings, Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, World Heritage Sites and Registered Battlefields (and also including some Conservation Areas) and non-designated heritage assets of archaeological interest which are demonstrably of equivalent significance to Scheduled Monuments, as identified in Section 5.9.6 of EN-1 (2023);
- **Designated heritage assets of less than the highest significance**, as identified in Section 5.9.30 of EN-1, comprising Grade II Listed buildings and Grade II Registered Parks and Gardens (and also some Conservation Areas); and
- **Non-designated heritage assets**, as defined within the PPG as "buildings, monuments, sites, places, areas or landscapes identified by plan-making bodies as having a degree of significance meriting consideration in planning decisions, but which do not meet the criteria for designated heritage assets".

H.7.3 MAGNITUDE OF IMPACT

H.7.3.1 Magnitude of impact is the predicted degree of change to the existing baseline environment during and/or following the construction of the Proposed Development. The methodology for predicting the degree of change that will be employed in this assessment moves away from the more traditional 'scalar', matrix-led approach. It instead adopts a descriptive, qualitative presentation of the changes to heritage significance that are predicted as a result of the Proposed Development, which directly reflects key concepts in current planning policy and heritage guidance and allows for a less constrained assessment of effects.

H.7.4 SIGNIFICANCE OF EFFECTS

H.7.4.1 The process of carefully describing the level of heritage significance of each asset that may be affected by the Proposed Development and the interests from which that significance derives, combined with a prediction of the degree of change (magnitude) to this significance following the Proposed Development, will allow for an assessment of

the overall effect of the Proposed Development upon the asset in question. In each case professional judgement will be employed to determine the likely significance of the effect. In reference to EIA regulations, where the Proposed Development is predicted to result in a substantial erosion of the significance of a heritage asset, this may be described as a significant effect.

H.7.5 ASSESSING HARM TO HERITAGE SIGNIFICANCE

H.7.5.1 Potential development effects will also be discussed in terms of harm to heritage significance with reference to the EN-1 (2023), as follows:

- **Substantial harm or total loss:** Being a level of harm that as confirmed in recent case law would "have such a serious impact on the significance of the asset that its significance was either vitiated altogether or very much reduced".
- **Less than substantial harm:** Being any lesser level of harm than that defined above; recent case law has confirmed that this includes any level of harm (not considered substantial) regardless of its quantification, e.g. the finding of a 'negligible' level of harm must still be treated as less than substantial harm and be weighed in the balance under Section 5.9.32.

H.7.5.2 The PPG provides that the category of harm identified for any given asset be 'explicitly identified', and that the extent of that harm be 'clearly articulated'. For purposes of this assessment, this is done with reference to a 'scale', e.g. at the lower/upper end of the scale of less than substantial.

H.7.5.3 EN-1 does not provide that harm to non-designated heritage assets be categorised as 'substantial' or 'less than substantial', only that the scale of any harm or loss is articulated.

H.7.5.4 The High Court has clarified that 'preservation' does not mean no change; it specifically means no harm. This is echoed in Historic England's GPA 2, which states that "Change to heritage assets is inevitable but it is only harmful when significance is damaged".

H.8 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

H.8.1.1 Although it is unlikely that the overall predicted impacts of the Proposed Development on cultural heritage resources will diverge from the assessment presented here, there are important limitations to the available data set that it is important to highlight:

- Desk-based research relies on baseline data from third-party sources. More often than not these sources are entirely reliable, yet there are inevitable gaps in their geographical coverage;

- This scoping report relies on information from the Consented Development application for Keuper Gas Storage Project, the findings of which will need to be updated; and
- Although below ground impacts can be predicted, there is always potential for encountering previously unknown and unexpected remains.

H.9 SUMMARY AND CONCLUSIONS

H.9.1.1 This scoping report has provided an overview of the baseline conditions for heritage within the Scoping Boundary and Study Area. It has reviewed the assessment provided in the Consented Development and highlighted changes in the composition and layout of this earlier version of the scheme and the Proposed Development and noted where additional assessment is required.

H.9.1.2 Though the changes to the consented scheme are relatively small, they are substantial enough to warrant further assessment. Key amongst them is the increase in size and westward extension of the GPP footprint. Key sensitivities include the potential for currently unknown buried archaeology to be present within the Scoping Boundary at Drakelow Hall and King Street. An outline of the approach to further survey including a staged archaeological investigation has been provided and a methodology for assessment outlined.

APPENDIX I SOCIO-ECONOMIC CHARACTERISTICS

I. SOCIO-ECONOMIC CHARACTERISTICS

I.1 INTRODUCTION

I.1.1.1 This chapter will consider the potential socio-economic effects of the Proposed Development during the following development stages: construction, operation and maintenance, and decommissioning.

I.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

I.2.1 OVERVIEW

National Policy Statement (NPS)

I.2.1.2 The Overarching National Policy Statement for Energy (EN-1) sets out the national policy for energy infrastructure[110]. Section 5.13 identifies the socio-economic impacts that should be considered. These include:

- the creation of jobs and training opportunities;
- the contribution to the development of low-carbon industries at the local and regional level as well as nationally;
- the provision of additional local services and improvements to local infrastructure;
- any indirect beneficial impacts for the region hosting the infrastructure;
- effects on tourism and other users of the area;
- the impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure; and
- cumulative effects.

National Planning Policy Framework (NPPF)

I.2.1.3 That National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and provides a framework for sustainable development planning[111]. The NPPF has three overarching objectives: an economic objective, a social objective, and an environmental objective. The economic objective focuses on building a strong, responsive and competitive economy, including by identifying and coordinating the provision of infrastructure. The social objective focuses on supporting strong, vibrant and healthy communities.

[110] DESNZ (2023), Overarching National Policy Statement for Energy (NPS EN-1). Available Online at: EN-1 Overarching National Policy Statement for Energy
[111] Ministry of Housing, Communities and Local Government (2024), National Planning Policy Framework. Available Online at: National Planning Policy Framework

Local Plan

I.2.1.4 The Cheshire West and Chester Local Plan was adopted in January 2015[112]. The following strategic objectives of the Local Plan are considered relevant to the socio-economic assessment:

- SO02: Support a vibrant, diverse and competitive local economy that provides a range of job opportunities to support sustainable communities.
- SO07: Support education and skills and ensure that deprived communities have access to services and employment.

I.3 BASELINE ENVIRONMENT

I.3.1 STUDY AREA

I.3.1.1 The Proposed Development is located in the ward area of Shakerley, within the local authority of Cheshire West and Chester (CWAC). The Study Area therefore comprises the ward of Shakerley, as this is where any direct impacts will occur, and the local authority of CWAC, as this is the level at which employment and supply chain effects will be assessed. Socio-economic data is therefore provided for the ward and local authority areas and benchmarked against the national average. Where ward-level data is not available, local authority data is used instead.

I.3.2 DATA SOURCES – SCOPING

I.3.2.1 The previous socio-economic assessment included in the Environmental Statement (ES) for the Consented Development [113] used baseline data from the 2011 Census, the 2013 Annual Population Survey (APS), and the 2010 Indices of Multiple Deprivation (IMD). This scoping report provides an updated baseline, using data from the most recent available sources.

I.3.2.2 The following data sources are used to provide preliminary baseline information for the purpose of the scoping report:

- Census 2021, accessed via Nomis[114];
- Annual Population Survey (APS) 2024, via Nomis;
- Business Register and Employment Survey (BRES) 2024, via Nomis; and
- English IMD, n2019[115].

[112] Cheshire West and Chester Council (2015), Cheshire West and Chester Local Plan. Available Online at: Local Plan - Part One | Cheshire West and Chester Council
[113] ERM (2015) Keuper Gas Storage Project – Environmental Statement
[114] Nomis Official Census and Labour Market Statistics. Available Online at: Nomis - Official Census and Labour Market Statistics
[115] English Indices of Multiple Deprivation. Available Online at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

I.3.3 DESCRIPTION

Population and Demographics

I.3.3.2 **Table I**.1 below shows the population profile of the Study Area. There is notably an older population profile in Shakerley than both the wider local authority area and the national average. As such the area closest to the Proposed Development is an elder population with a smaller proportion of working aged residents than Cheshire West & Chester and England.

TABLE I.1 - POPULATION PROFILE

Demographics	Shakerley	Cheshire West & Chester	England
All usual residents	5,435	361,799	57,112,542
0–15	16%	17%	19%
16–64	57%	61%	63%
65+	27%	21%	19%

Source: ONS (2022), Population estimates

I.3.3.3 **Table I**.2 below shows the change in the population profile over a five-year period from 2017 to 2022. While the overall population in Shakerley increased more than the local authority and national average, the most profound increase was in the population aged over 65 which increased almost three times the national rate.

TABLE I.2 - POPULATION CHANGE (2017–2022)

Demographics	Shakerley	Cheshire West & Chester	England
Population Change	9.3%	4.6%	2.7%
Population aged 0-15	2.9%	3.0%	0.6%
Population of working age (16-64)	6.7%	3.5%	2.1%
Population aged 65+	19.9%	8.9%	6.8%

Source: ONS (2022), Population estimates

Economy and Employment

I.3.3.4 The most recent data which was released in 2024 shows that the GVA in 2022 in Shakerley stood at £254 m, accounting for approximately 1.9% of the overall GVA of Cheshire West & Chester. The measure of GVA per head is a ratio of GVA per resident. The GVA per head in Shakerley is almost double that of the UK which could indicate a higher concentration of residents working in high value industries or more productive industries in the area closest to the Proposed Development.

TABLE I.3 - GVA, 2022

	Shakerley	Cheshire West & Chester	UK
Total GVA (£m)	£254	£13,222	£2,246,047
GVA per Head[116]	£60,059	£36,522	£33,227

Source: ONS 2024

I.3.3.5 **Table I**.4 below provides the most recent available labour market participation statistics from the Annual Population Survey (APS). This data is not available at ward level in the APS and so data is presented for the local authority area of Cheshire West & Chester and benchmarked against England. The data for Cheshire West & Chester indicates a buoyant economic market with higher rates of economic activity and employment compared to the national average, and a lower rate of unemployment.

TABLE I.4 - ECONOMIC ACTIVITY

	Shakerley	Cheshire West & Chester	England
Economic activity rate (aged 16–64)	n/a	84.7	78.8
Employment rate (aged 16–64)	n/a	82.6	75.7
Unemployment rate (aged 16–64)	n/a	2.5	3.9

Source: ONS (2024), APS, October 2023 – September 2024

[116] GVA per head refers to the total economic output generated within a specific region or area, divided by the population of that area. Therefore it shows the average economic value produced per person in that location.

I.3.3.6 Shakerley has three dominant employment sectors that together account for almost 46% of all jobs in the area which are; manufacturing (17.1%), mining, quarrying & utilities (14.3%) and health (14.3%). The proportion of employment in these three sectors is higher than the local authority and national averages.

TABLE I.5 - EMPLOYMENT BY SECTOR

	Shakerley	Cheshire West & Chester	England
Agriculture, forestry and fishing	2.1%	0.9%	0.5%
Mining, quarrying and utilities	14.3%	1.2%	1.1%
Manufacturing	17.1%	8.3%	7.4%
Construction	2.1%	4.1%	4.7%
Motor trades	5.0%	2.4%	1.7%
Wholesale	5.0%	2.7%	3.8%
Retail	1.4%	9.5%	8.2%
Transport and storage	7.1%	3.6%	5.1%
Accommodation and food services	5.0%	8.9%	7.8%
Information and communication	2.1%	2.1%	4.8%
Financial and insurance	1.0%	5.3%	3.4%
Property	0.3%	2.1%	1.9%
Professional, scientific and technical	7.1%	10.7%	9.6%
Business administration and support services	6.4%	8.9%	8.9%
Public administration and defence	0.0%	4.1%	4.4%
Education	1.4%	8.3%	8.6%
Health	14.3%	11.8%	13.5%
Arts, entertainment, recreation and other	8.6%	5.3%	4.5%

Source: ONS (2024), BRES 2023

I.3.3.7 The occupation structure in Shakerley outlined in **Table I**.6 below shows that there is a greater proportion of people employed in Standard Occupational Classification (SOC) Groups 1–3 with 50.5% of all employees compared to 47.7 in Cheshire West and Chester and 46.5% nationally. These occupations are generally considered to be of a higher skill level.

TABLE I.6 - OCCUPATION

SOC Groups	Shakerley	Cheshire West & Chester	England
1. Managers, directors and senior officials (%)	18.6	14.0	12.9
2. Professional occupations (%)	18.7	20.5	20.3
3. Associate professional occupations (%)	13.2	13.2	13.3
4. Administrative and secretarial occupations (%)	9.2	8.9	9.3
5. Skilled trades occupations (%)	11.2	9.3	10.2
6. Caring, leisure and other service occupations (%)	7.6	8.8	9.3
7. Sales and customer service occupations (%)	5.7	8.2	7.5
8. Process, plant and machine operatives (%)	6.1	6.9	6.9
9. Elementary occupations (%)	9.7	10.2	10.5

Source: Census (2021)

I.3.3.8 **Table I**.7 below displays the qualification profile for Cheshire West and Chester residents which shows that there is a higher proportion qualified at degree level or higher than nationally (35.7% and 33.9% respectively), which resonates with the higher level of SOC 1-3 occupations above. However, Shakerley has marginally smaller

proportion or residents with at least a degree level qualification (33.7%).

I.3.3.9 Additionally, both Shakerley and Cheshire West and Chester have a lower proportion of residents with no qualifications than seen nationally, which indicates an above average skilled workforce located near to the Proposed Development.

TABLE I.7 - QUALIFICATIONS PROFILE

	Shakerley	Cheshire West & Chester	England
Level 1 and entry level qualifications	10.1	9.3	9.7
Level 2 qualifications	13.7	13.7	13.3
Level 3 qualifications	16.2	17.8	16.9
Level 4 qualifications or above	33.7	35.7	33.9
Other qualifications	9.8	7.7	8.1
No qualifications	16.4	15.8	18.1

Source: Census 2021

I.3.3.10 The indices of multiple deprivation (IMD) data is aggregated up from the Lower Super Output Area (LSOA) level. These are typically areas that contain a population size of between 1,000 and 3,000 people. The IMD data ranks all LSOAs in England from most deprived to least deprived across seven 'domains' of deprivation: income, employment, education, health, crime, and barriers to housing. Three LSOAs build up to the Shakerley ward where the Proposed Development is located, and the wider local authority area has 212 LSOAs.

I.3.3.11 **Table I**.8 shows the number of LSOAs in Cheshire West and Chester local authority that falls within deciles where 1st is the most deprived and 10th is the least. –– and the associated population. Across the local authority approximately 40% of the LSOAs (~150,000 people) are in the 30% least deprived nationally. The three LSOAs that make up the Shakerley ward fall within the 5th and 6th deciles – meaning they are sat roughly in the mid-point of the deprivation rank relative to the rest of England.

TABLE I.8 - POPULATION IN EACH DEPRIVATION DECILE

	Local Authority – Cheshire West & Chester	
Decile	LSOAs	Proportion of Population[117]
Most deprived	16	7.3%
2nd	18	7.9%
3rd	19	9.2%
4th	16	7.0%
5th	13	6.3%
6th	19	9.0%
7th	19	10.0%
8th	27	12.0%
9th	30	14.2%
Least deprived	35	17.1%

Source: IMD, 2019

Tourism and recreation

I.3.3.12 Using both the ONS tourism sector definitions[118] and the latest Business Register and Employment Survey (BRES) data it has been estimated that the tourism sector in Cheshire West and Chester stood at 21,795 employees in 2023 and has increase by 14.1% over the five-year period from 2018—higher than the national rate (+8.4%).

I.3.3.13 The previous socio-economic assessment included in the Environmental Statement for the Consented Development [119] identified tourism receptors within Cheshire West and Chester and public rights of way (PRoW) within the site area. These have not changed since the Consented Development was approved.

I.3.4 KEY SENSITIVITIES

I.3.4.1 The key sensitivity for socio-economics is the existing elderly population profile in Shakerley which is coupled with a smaller

[117] Note population does not match the previous population total due to the changing in LSOA's from 2011 to 2021

[118]ONS (2016) Workers in the Tourism Sector: Examining their Private Pension Savings, Great Britain, July 2012 to June 2014. Online. Accessed < Workers in the tourism sector - Office for National Statistics >

[119] ERM (2015) Keuper Gas Storage Project – Environmental Statement

proportion of the population of working age. Additionally, the proportion of residents aged over 65 is increasing at a faster rate than nationally which could limit local labour supply in the future. Employment and economic activity rates are high in both Shakerley and Cheshire West and Chester. Employment in Shakerley is characterised by higher than average rates of employment in the manufacturing and utilities sectors.

I.4 BASIS OF ASSESSMENT

I.4.1.1 The assessment is based on the difference in project scope between the Consented Development, and the proposed amendments in the material change application during construction, operation and maintenance, and decommissioning phases. It also takes account of changes in legislation, policy, guidance, and established industry best practice since the Consented Development.

I.4.1.2 It is assumed that effects arising during decommissioning will be comparable, or less severe, than those associated with construction. Decommissioning effects are therefore considered as part of the construction assessment.

I.5 MITIGATION

I.5.1.1 Embedded mitigation measures will be incorporated into the design layout and principles of the Proposed Development as part of the design process. The assessment will take account of the findings of other relevant environmental assessments including Air Quality, Noise and Vibration, Traffic and Transport, and Landscape and Visual, and the mitigation measures recommended by those topics, including measures set out in the Construction Environment Management Plan (CEMP) and Construction Traffic Management Plan (CTMP). Where significant adverse effects on socio-economics are identified, the assessment will recommend further mitigation measures to reduce or remove effects.

I.6 LIKELY SIGNIFICANT EFFECTS – EIA

I.6.1.1 **Table I**.9 summarises the effects that are proposed to be scoped in for further assessment and those that are proposed to be scoped out, and explains the rationale.

TABLE I.9 - SUMMARY OF EFFECTS TO BE SCOPED IN / OUT

Category of effect	Scoped in/out	Rationale
Employment and supply chain effects	In	The construction and operation of the Proposed Development will create jobs directly and indirectly in the supply chain which could have the potential for a significant effect within the local labour market. The socio-economic assessment in the ES for the Consented Development included an assessment of construction and operation employment. It is proposed that the EIA for the Proposed Development will provide a more detailed assessment of direct, indirect and induced employment within the Study Area, in line with current industry best practice.
GVA effects	In	The construction and operation of the Proposed Development will generate GVA in the local, regional and national economy which could have the potential for significant effects. The socio-economic assessment in the ES for the Consented Development did not include consideration of GVA effects. This is therefore proposed to be scoped in for further assessment.
Skills and training opportunities	In	The construction and operation of the Proposed Development will create training opportunities which could support the development of the skills needed for the Net Zero transition within the local labour market. The socio-economic assessment in the ES for the Consented Development pre-dated the NPS EN-1 and did not include consideration of skills and training opportunities. This is therefore proposed to be scoped in for further assessment.
Wider socio-economic effects	In	The construction and operation of the Proposed Development could have wider and knock-on socio-economic effects including structural economic change, disruption to established local industries, or contribution to the development of low-carbon industries within the Study Area, which could

Category of effect	Scoped in/out	Rationale
		have the potential for a significant effect within the local economy. The socio-economic assessment in the Consented Development ES did not include consideration of wider socio-economic effects. This is therefore proposed to be scoped in for further assessment.
Tourism, amenity and leisure	In	The construction and operation of the Proposed Development could have the potential for direct and indirect impacts on public rights of way (PRoW) within the site boundary, including as a result of temporary diversions or closures, or in-combination effects on amenity. While direct impacts on PRoW are not expected to be materially different from those assessed in the ES for the Consented Development, in-combination effects on amenity could be materially different due to the presence of a vent stack and potential visible flaring of gas. Effects on PRoW are therefore proposed to be scoped in for further assessment.
Access	Out	The socio-economic assessment in the ES for the Consented Development concluded that, during construction, there would be a small short-term impact, temporary in nature, due to increased levels of traffic, but that access to businesses or properties would not be prevented. It is not anticipated that the impact on access from the Proposed Development would be materially different, and it is therefore proposed that access is scoped out of any further assessment.
Land use and business operators	Out	The socio-economic assessment in the ES for the Consented Development concluded that, after mitigation through appropriate compensation arrangements, the impact of land take on agricultural businesses would be negligible. The land take associated with the Proposed Development is not expected to be substantially greater than under the consented scheme and so it is not anticipated that there will be a likely significant effect on land

Category of effect	Scoped in/out	Rationale
		use and business operators. This is therefore proposed to be scoped out of any further assessment.
Accommodation; Socio-cultural effects	Out	The socio-economic assessment in the ES for the Consented Development concluded that the majority of construction workers would be drawn from within a wider Study Area, including urban centres such as Manchester, Liverpool, Warrington and Northwich, all of which are within a 60-minute drive time of the Site. This reduced the potential for significant effects on the availability of accommodation and services, and on local demographics, from an incoming construction workforce. Given that there is an established sub-regional supply chain, this is not expected to change substantially for the Proposed Development, despite the relatively constrained labour market conditions within Shakerley and Cheshire West and Chester. This is therefore proposed to be scoped out of any further assessment.

I.6.2 OVERVIEW

I.6.2.1 There is limited guidance available for the assessment of socio-economic effects. Therefore, the assessment will be based on professional judgement and established industry best practice.

I.6.2.2 An economic model will be built to quantify the direct, indirect and induced effects of the Proposed Development on employment and GVA in the Study Area during construction and operation. This will take account of local skills and supply chains and will include consideration of leakage and displacement effects. It will also seek to identify measures that could support the delivery of positive effects for the local supply chain.

I.6.2.3 As noted in **section I.4**, it is assumed that decommissioning effects will be comparable, or less than, those arising during construction, and so decommissioning will be considered as part of the construction assessment.

I.6.3 ASSESSMENT CRITERIA

I.6.3.1 The sensitivity of potential receptors can be described qualitatively according to the categories presented in **Table I.10**.

TABLE I.10 - SENSITIVITY CRITERIA

Sensitivity	Receptor
High	• There is no or low availability of labour and skills in the local workforce, for example, as a result of very low unemployment rates. Therefore, the Proposed Development would lead to labour market pressure and distortions (i.e. skills and capacity shortages, import of labour, wage inflation). • A receptor is of high socio-economic or land use value. It is of importance at a national or international level and has little capacity to absorb change without fundamentally altering its present character. • A receptor possesses priority in national socio-economic or land use strategy / policy.
Medium	• The area has a constrained supply of labour and skills. Therefore, the Proposed Development may lead to labour market pressure and distortions.

Sensitivity	Receptor
	• A receptor is of moderate socio-economic or land use value. It is of importance as a national level and has some capacity to absorb change without fundamentally altering its present character. • A receptor possesses priority in local socio-economic or land use strategy / policy.
Low	• A receptor is of moderate socio-economic or land use value. It is of importance at a national/local level and can absorb change without fundamentally altering its present character. • A receptor is not identified as a priority in local socio-economic or land use strategy / policy

I.6.3.2 The magnitude of impacts will be determined by considering the intensity (or scale), spatial coverage and longevity of an impact. The magnitude assigned will also use professional judgement to take into consideration the application of statutory standards and non-statutory standards or guidelines. The magnitude of impact on the receptors is presented in **Table I**.11.

TABLE I.11 - MAGNITUDE CRITERIA

Impact Magnitude	Description	Example
Large	• Total loss or major alteration (positive or negative) of a socio-economic or land use receptor. • This could include permanent closure or severe effect upon the viability of a business, community facility or public service, or closure or restricted access to PRoW.	Permanent closure of a business or community facility.
Medium	• Loss of, or alteration to (positive or negative), one or more key elements of a	Temporary or permanent loss of land associated with

Impact Magnitude	Description	Example
	socio-economic or land use receptor's baseline value. • This could include a moderate change to business revenues with potential job losses but no threat to the viability of the business, moderate change to the function or service of community facilities and public services, or a moderate reduction in access to recreational PRoW.	a business or community facility or substantial change in its operating environment that could affect its ability to function.
Small	• Slight alteration (positive or negative) of the socio-economic or land use receptor's baseline value. • This could include a low change to business revenues with isolated job losses but no threat to the viability of the business, low change to the function or service of community facilities and public services, or low reduction in access to recreational PRoW.	Temporary loss of land associated with a business or community facility or minor change in its operating environment that is unlikely to affect its ability to function.
Negligible	• Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.	Very minor change in the operating environment of a business or community facility.

I.6.3.3 The significance of effect is determined by assessing the potential magnitude of impact on the receptors against the sensitivity of the receptor. **Table I**.12 presents the matrix showing the significance of effects. Moderate or major effects are considered significant in EIA terms.

TABLE I.12 - SIGNIFICANCE MATRIX

Impact Magnitude	Magnitude of Impact			
	Negligible	**Small**	**Medium**	**Large**
High	Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant	Major Adverse – Significant
Medium	Not Significant	Minor Adverse – Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant
Low	Not Significant	Not Significant	Minor Adverse – Not Significant	Minor Adverse – Not Significant

I.7 SUMMARY AND CONCLUSIONS

I.7.1.1 The baseline shows that the Study Area has an ageing population, high rates of employment and economic activity, strong manufacturing and utilities sectors, and low rates of deprivation.

I.7.1.2 It is proposed that the assessment will include employment and supply chain effects, GVA, training and skills opportunities, wider socio-economic effects, and effects on tourism, amenity and leisure.

I.7.1.3 Effects on land use and business operators, and socio-cultural effects, are proposed to be scoped out of further assessment.

APPENDIX J POPULATION AND HUMAN HEALTH

J. POPULATION AND HUMAN HEALTH

J.1 INTRODUCTION

J.1.1.1 This chapter will consider the potential population and human health effects of the Proposed Development during the following development stages: construction, operation and maintenance, and decommissioning. The potential for effects to arise from pre-construction activity is also considered within this chapter, in line with established best practice for human health assessment.

J.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

J.2.1 OVERVIEW

J.2.1.1 The assessment will be undertaken in line with the following policy and guidance:

- Article 3 of the amended EIA Directive (2014/52/EU)[120];
- National Policy Statement for Energy (NPS EN-1)[121];
- Cheshire West and Chester Local Plan 2015[122];
- Institute of Environmental Management (IEMA) (2022), Guide to Effective Scoping of Human Health in Environmental Impact Assessment;
- IEMA (2022), Guide to Determining Significance for Human Health in Environmental Impact Assessment;
- Public Health England (PHE) (2020), Health Impact Assessment in Spatial Planning; and
- National Health Service (NHS) London Healthy Urban Development Unit (HUDU) (2019), Rapid Health Impact Assessment Tool.

J.3 BASELINE ENVIRONMENT

J.3.1 STUDY AREA

J.3.1.1 The Proposed Development is located in the ward area of Shakerley which is within the local authority of Cheshire West and Chester (CWAC). The Study Area therefore comprises the ward of Shakerley, as this is where any direct impacts will occur, and the local authority of CWAC, as this is the level at which employment and supply chain effects will be assessed. Socio-economic data is therefore, provided for the ward and local authority areas and benchmarked against the national average. Where ward-level data is not available, local authority data is used instead.

[120] Directive 2014/52/EU of the European Parliament and of the Council of the European Union. Available Online at: Directive - 2014/52 - EN - EIA - EUR-Lex
[121] DESNZ (2023), Overarching National Policy Statement for Energy (NPS EN-1). Available Online at: EN-1 Overarching National Policy Statement for Energy
[122] Cheshire West and Chester Council (2015), Cheshire West and Chester Local Plan. Available Online at: Local Plan - Part One | Cheshire West and Chester Council

J.3.1.2 The baseline is comparable to that provided in **Technical Appendix I Socio-economic Characteristics**, with additional data relating to health.

J.3.2 DATA SOURCES - SCOPING

J.3.2.1 The baseline to inform this scoping chapter has drawn on data from the following sources:

- Office for National Statistics (ONS), Census 2021;
- ONS, Annual Population Survey (APS);
- Index of Multiple Deprivation, 2019;
- NHS Digital;
- Cheshire West and Chester JSNA;
- Department for Work and Pensions; and
- Department for Environment, Food and Rural Affairs.

J.3.3 METHODOLOGY

J.3.3.1 The Environmental Statement for the Consented Development did not include a standalone population and human health chapter, although some aspects such as demographics and amenity were considered as part of the socio-economics assessment. This chapter will report any new population and health receptors associated with the material change.

J.3.3.2 The baseline data collection for the scoping chapter was a desk-based exercise drawing on published data and statistics from the sources listed above. No surveys or stakeholder engagement have been undertaken at this stage. The baseline provided in the ES will additionally include information gathered through the stakeholder engagement process.

J.3.4 DESCRIPTION

Physical Environment

J.3.4.2 The most recent Joint Strategic Needs Assessment (JSNA)[123] from Cheshire West and Chester outlines a number of key health metrics for the wider authority. The assessment provides a review of the health and wellbeing needs of the population in the borough. The JSNA shows that in terms of CO_2 emissions per capita the local authority is greater than the national average at 7.3 kt CO_2 compared to 4.3 kt CO_2 nationally. Despite this there has been a 53.2% reduction in emissions per capita since 2012 in Cheshire West and Chester.

J.3.4.3 The Consumer Data Research Centre (CDRC) produces a multi-dimensional index that measure how 'healthy' neighbourhoods are. The figures are the Median Normalised Difference Vegetation Index

[123] Cheshire West & Chester (2024) State of the Borough. Online. Accessed at <Health and wellbeing adults | Cheshire West and Chester Council >

(NDVI) scores (-1 to 1). **Table J-1** below outlines a number of the key metrics relating to an area's physical environment. The table shows that the Shakerley ward scores more highly in terms of air quality and green space than both Cheshire West and Chester and England. However, its score against the physical environment domain is considerably lower than the comparator areas.

TABLE J-1 - AHAH INDEX

AHAH	Shakerley	Cheshire West and Chester	England
Air quality domain	0.18	0.23	0.26
Green space (passive)	0.56	0.49	0.42
Physical environment domain	-0.58	-0.36	0.03

Source: CDRC, 2024

J.3.4.4 Additionally, on average, 7.27% of households in Shakerley have access to green space. This is lower than the proportion of households with access to green space in Cheshire West and Chester (18.51%) and lower than the proportion in England (23.04%)[124].

Socio-Economic Deprivation

J.3.4.5 The socio-economic deprivation is outlined in **Technical Appendix I, Socio-economic characteristics** in **Section I.3.3**. The Index of Multiple Deprivation (IMD) data ranks all Lower Super Output Areas (LSOAs) in England from most deprived to least deprived across seven 'domains' of deprivation: income, employment, education, health, crime, and barriers to housing. Domain rank 1 is the most deprived and relates to being in the top 10% most deprived in the country. These make up to build the wider local authority area and the ward that the Proposed Development is located in.

J.3.4.6 The three LSOA areas in Shakerley ward fall in the mid-range of the overall deprivation domain nationally in the 5th and 6th decile. In terms of health and disability domain the three LSOA's vary from deciles 3, 6 and 7. This suggests there are potentially sensitive communities in pockets of the ward.

J.3.4.7 Further, data shows the average LSOA rank, where a lower rank indicates that an area is experiencing higher levels of deprivation. Shakerley has an average rank of 8,695 on the Living Environment domain. This means that Shakerley has higher levels of local environment deprivation relative to Cheshire West and Chester (17,760) and higher levels of deprivation relative to England (16,158).

[124] DEFRA (2024) Access to Green Space in England

Economic Activity

J.3.4.8 **Technical Appendix I, Socioeconomic characteristics** provides a summary of the economic activity and unemployment statistics. The headline message is that there is below average unemployment in Cheshire West and Chester in comparison to England.

J.3.4.9 Information from the Department for Work and Pensions (DWP[125]) shows that in Cheshire West and Chester there is a below average rate of unemployment benefit claimants[126] (2.65% compared to 4.22%). Youth unemployment (18–24) receiving unemployment benefits at 4.38% is also lower than average when compared to 5.48% nationally.

State of Health and Wellbeing

J.3.4.10 **Table J-2** below shows data from Census 2021 on the total number and proportion of residents within each response category from a self-assessment of general health.

J.3.4.11 The results show that 0.9% of people in Shakerley have very bad health. This is lower than the proportion in Cheshire West and Chester (1.18%) and lower than the proportion in England (1.17%). Additionally, when comparing the results to the 2011 Census the proportion of people suffering with very bad health has decreased from 2.3% to 0.9%. However, there is a greater proportion of people in Shakerley with self-reported fair and bad health – therefore despite having a smaller proportion with very bad health the overall picture presents a more negative picture of self-reported health.

TABLE J-2 - SELF-REPORTED GENERAL HEALTH

	Shakerley	Cheshire West and Chester	England
Very Good	47.9%	48.8%	48.5%
Good	31.8%	33.3%	33.7%
Fair	14.8%	12.7%	12.7%
Bad	4.6%	4.1%	4.0%
Very Bad	0.9%	1.2%	1.2%

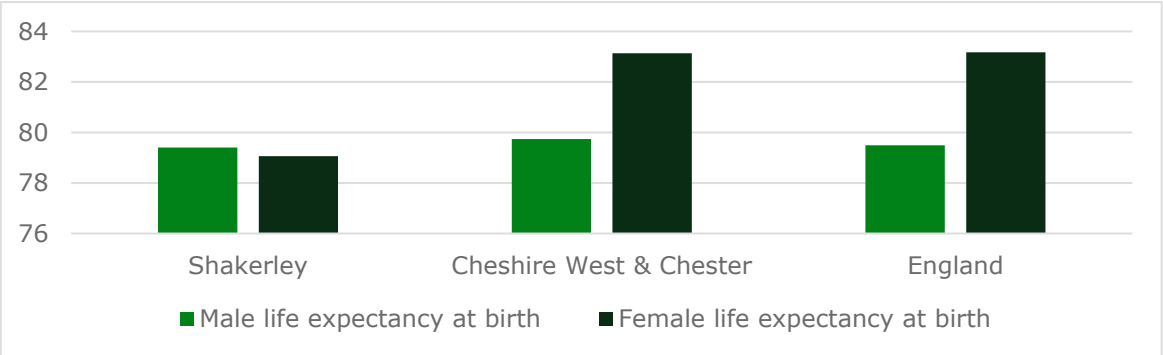
Source: Census 2021

J.3.4.12 Physical Health and Wellbeing

[125] DWP (2024) Statistics at DWP
[126] The proportion of people receiving benefits payable to people who are unemployed receiving either Jobseekers Allowance or Universal Credit for those who are out of work

J.3.4.13 **Figure J-1** below[127] shows male and female life expectancy at birth in 2016 to 2021. Life expectancy at birth is a useful summary measure of all-cause mortality as it quantifies the differences between areas in units (years of life) that are more readily understood and meaningful than other measures. It represents the cumulative effect of the prevalence of risk factors, the prevalence and severity of disease, and the effectiveness of interventions and treatment. Differences in levels of all-cause mortality reflect health inequalities between different population groups, e.g. by gender or place.

FIGURE J-1 - LIFE EXPECTANCY AT BIRTH



Source: ONS (2021)

J.3.4.14 There is a variation across genders in terms of life expectancy. In Shakerley the male life expectancy from birth is 79.40 years old. Which is lower than both Cheshire West and Chester and England averages. The picture is starker when looking at the female life expectancy from birth in Shakerley which is 79.06 years old. This figure is notably lower than the life expectancy in Cheshire West & Chester (83.13 years old) and lower than the life expectancy in England (83.17 years old). Therefore, across both gender categories the life expectancy at birth in Shakerley is lower than the national average highlighting potentially poor local health indicators.

J.3.4.15 The percentage of adults classified as obese in Cheshire West and Chester was 23.7%[128] which is below the national average England 25.3% (2020/21). The Sport England Active Lives Survey adds weight to this. It highlights Cheshire West and Chester as having a higher proportion of adults who are physically active[129] in comparison to the national average (66.05% and 63.71% respectively).

J.3.4.16 In terms of child health, 6.67% of children aged 4–5 were categorised as obese or severely obese in Shakerley between 2021 to 2024. This is lower than the rate in Cheshire West and Chester (8.74%) and lower than the rate in England (9.64%)[130].

[127] Office for Health Improvements (2021) Health Inequalities Dashboard
[128] Ibid.
[129] People are described as being active if they have done at least 150 minutes of moderate intensity equivalent physical activity (excluding gardening) in the past week.
[130] NHS Digital (2024) National Child Measurement Programme

J.3.4.17 Additionally, the proportion of children providing unpaid care in Shakerley is 1.1%. This is similar to the proportion in Cheshire West & Chester (1.17%) and similar to the proportion in England (1.06%)[131].

Health Inequalities

J.3.4.18 Census 2021 data in **Table J-3** below shows Shakerley has a higher rate of residents who are classified as disabled under the Equality Act as well as those who's day to day activities are limited a little or a lot.

TABLE J-3 - DISABILITY

	Shakerley	Cheshire West and Chester	England
Disabled under the Equality Act	20.2	18.5	17.3
Day-to-day activities limited a lot	8.5	7.7	7.3
Day-to-day activities limited a little	11.7	10.7	10.0
Not disabled under the Equality Act	79.8	81.5	82.7
Has long term physical or mental health condition but day-to-day activities are not limited	7.1	7.7	6.8
No long term physical or mental health conditions	72.7	73.8	75.9

Source: Census 2021

J.3.4.19 The Census provides information on the proportion of people providing unpaid care for different amounts of time each week. A person is a provider of unpaid care if they give any help or support to family members, friends, neighbours or others because of long-term physical or mental health or disability, or problems related to old age. **Table J-4** includes all people providing unpaid care. The proportional split is similar to the national profile with marginally fewer providing no unpaid care in Shakerley.

[131] ONS (2021) Census

TABLE J-4 - PROVISION OF UNPAID CARE

	Shakerley	Cheshire West and Chester	England
0 Hours	90.4%	90.4%	91.2%
<9 Hours	3.8%	3.5%	3.1%
10-19 Hours	1.5%	1.3%	1.2%
20-34 Hours	0.8%	0.9%	0.9%
35-49 Hours	0.8%	1.0%	1.0%
>50 Hours	2.8%	2.9%	2.6%

Source: Census 2021

J.3.4.20 **Table J-5** below shows that both Shakerley and Cheshire West and Chester is less ethnically diverse than the national average.

TABLE J-5 - ETHNICITY PROFILE

	Shakerley	Cheshire West and Chester	England
Asian, Asian British or Asian Welsh	2.4	2.0	9.6
Black, Black British, Black Welsh, Caribbean or African	0.7	0.6	4.2
Mixed or Multiple ethnic groups	1.3	1.5	3.0
White	95.4	95.3	81.0
Other ethnic group	0.1	0.6	2.2

Source: Census 2021

J.3.5 KEY SENSITIVITIES

J.3.5.1 The key sensitivities for population and human health are the physical environment as Shakerley has higher than average CO_2 emissions per capita and also the proportion of households that have access to green space is significantly lower than the national average. This is compounded with two notable health inequalities with the below average life expectancy at birth, particularly for females and above average population who are disabled under the Equality Act and have their day-to-day activities limited a lot.

J.4 BASIS OF ASSESSMENT

J.4.1 CONSTRUCTION

J.4.1.1 The ES for the Consented Development was undertaken prior to the amendments to the EIA Directive (2014/52/EU) which brought population and human health into the EIA process, and therefore did not include a population and human health chapter. The basis for the assessment for population and human health will therefore be all activities associated with the construction of the Proposed Development. The potential for effects to arise from pre-construction activity is also considered within this chapter, in line with established best practice for human health assessment.

J.4.1.2 It is assumed that effects arising during decommissioning will be comparable, or less severe, than those associated with construction. Decommissioning effects are therefore considered as part of the construction assessment.

J.4.2 OPERATION AND MAINTENANCE

J.4.2.1 As above, the ES for the Consented Development did not include a population and human health chapter. The basis for the assessment for population and human health is therefore all activities associated with the operation and maintenance of the Proposed Development.

J.5 MITIGATION

J.5.1.1 Embedded mitigation measures will be incorporated into the design layout and principles of the Proposed Development as part of the design process. The assessment will take account of the findings of other relevant environmental assessments including Air Quality, Noise and Vibration, Traffic and Transport, and Landscape and Visual, and the mitigation measures recommended by those topics, including measures set out in the Construction Environment Management Plan (CEMP) and Construction Traffic Management Plan (CTMP). Where significant adverse effects on population and human health are identified, the assessment will recommend further mitigation measures to reduce or remove effects.

J.6 LIKELY SIGNIFICANT EFFECTS - EIA

J.6.1.1 IEMA guidance on health assessment confirms that EIA scoping should take a 'wider determinants of health' approach. **Table J-6** lists the wider determinants that should be considered as part of the scoping process and indicates which are proposed to be scoped in for further assessment and which are scoped out.

TABLE J-6 - WIDER DETERMINANTS OF HEALTH TO BE SCOPED IN / OUT

Categories	Wider determinants of health	Scoped in / out	Rationale
Health related behaviours	Physical activity	In	Scoped in as there is the potential for impacts on public rights of way (PRoW) within the Scoping Boundary, with potential implications for physical activity.
	Risk taking behaviour	Out	Not applicable to the Proposed Development as impacts on risk taking behaviour are not anticipated.
	Diet and nutrition	Out	Not applicable to the Proposed Development as impacts on diet and nutrition are not anticipated.
Social environment	Housing	Out	Scoped out as the construction workforce is anticipated to be largely home-based, reducing the potential for impacts on housing availability.
	Relocation	Out	Not applicable to the Proposed Development as no relocation will occur as a result.
	Open space, leisure and play	In	Scoped in as there is the potential for impacts on public rights of way (PRoW) within the Scoping Boundary, with potential implications for leisure and access.
	Transport modes, access and connections	In	Scoped in as there is the potential for construction traffic to impact on travel behaviour and access to community facilities.
	Community safety	In	Scoped in as local communities could have concerns about the real or perceived safety risks of the Proposed Development.

Categories	Wider determinants of health	Scoped in / out	Rationale
	Community identity, culture, resilience and influence	Out	Scoped out as the construction workforce is anticipated to be largely home-based, reducing the potential for impacts on community structures.
	Social participation, integration and support	Out	Scoped out as the construction workforce is anticipated to be largely home-based, reducing the potential for impacts on community cohesion.
Economic environment	Education and training	In	Scoped in as the Proposed Development may create opportunities for training and skills development, with potential implications for health and wellbeing.
	Employment and income	In	Scoped in as the Proposed Development will create employment opportunities, with potential implications for health and wellbeing.
Bio-physical environment	Climate change mitigation and adaptation	In	Scoped in as the Proposed Development may have an impact on population health and wellbeing through enhanced climate change mitigation and adaptation.
	Air quality	In	Scoped in as the Proposed Development may directly impact on community health through reduction in air quality. There could also be community concerns around perceived impacts on air quality.
	Water quality or availability	Out	Assessed in **Technical Appendix B Hydrology and Flood Risk**. Scoped out as effects on human health at the population level are not anticipated.

Categories	Wider determinants of health	Scoped in / out	Rationale
	Land quality	Out	Assessed in **Technical Appendix A Geology and Ground Conditions**. Scoped out as effects on human health at the population level are not anticipated.
	Noise and vibration	In	Scoped in as the Proposed Development may directly impact on community health through increases in noise and vibration. There could also be community concerns around perceived impacts on noise.
	Radiation	Out	Scoped out as effects on human health at the population level are not anticipated.
Institutional and built environment	Health and social care services	Out	Not applicable to the Proposed Development as impacts on health and social care services are not anticipated.
	Built environment	Out	Not applicable to the Proposed Development as impacts on the built environment are not anticipated.
	Wider societal infrastructure and resources	Out	Scoped out as the construction workforce is anticipated to be largely home-based, reducing the potential for impacts on other infrastructure and resources.

Source: IEMA (2022)

J.6.1.2 The socio-economic assessment undertaken for the ES for the Consented Development found that the majority of construction workers would commute daily and would therefore not require accommodation within the Study Area. As noted in **Table J-6**, this reduces the likelihood of human health and population effects associated with the presence of the construction workforce. The findings of the socio-economic assessment for the Proposed Development will be kept under review and, should they change substantially, this will be considered within the population and human health assessment.

J.7 PROPOSED APPROACH TO ASSESSMENT

J.7.1 OVERVIEW

J.7.1.1 The population and human health assessment will use professional judgement and understanding to determine the following:

- The sensitivity of the receptor; and
- The magnitude of the impact.

J.7.1.2 In determining receptor sensitivity, the assessment will take into account the characteristics of the local population and the presence of groups who may be more vulnerable to health inequalities.

J.7.2 ASSESSMENT CRITERIA

J.7.2.1 The sensitivity of potential receptors can be described qualitatively according to the categories presented in **Table J-7**.

TABLE J-7 - SENSITIVITY CRITERIA

Sensitivity	Receptor
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared between the population and the project; existing wide health inequalities; people who are prevented from undertaking daily activities; dependents; people with very poor health status; and/or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening health inequalities; people who are highly limited from undertaking daily activities; carers or people with additional support needs; people with poor health status; and/or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; narrow health inequalities;

Sensitivity	Receptor
	people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt.

J.7.2.2 The magnitude of impacts will be determined by considering the intensity (or scale), spatial coverage and longevity of an impact. The magnitude assigned will also use professional judgement to take into consideration the application of statutory standards and non-statutory standards or guidelines. The magnitude of impact on the receptors is presented in **Table J-8**.

TABLE J-8 - MAGNITUDE CRITERIA

Impact Magnitude	Description
Large	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/ injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Small	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications.
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few

Impact Magnitude	Description
	people affected; immediate reversal once activity complete; no service quality implication.

J.7.2.3 The significance of effect is determined by assessing the potential magnitude of impact on the receptors against the sensitivity of the receptor. **Table J-9** presents the matrix showing the significance of effects. Moderate or major effects are considered significant in EIA terms.

TABLE J-9 - SIGNIFICANCE MATRIX

Impact Magnitude	Magnitude of Impact			
	Negligible	Small	Medium	Large
High	Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant	Major Adverse – Significant
Medium	Not Significant	Minor Adverse – Not Significant	Moderate Adverse – Significant	Moderate Adverse – Significant
Low	Not Significant	Not Significant	Minor Adverse – Not Significant	Minor Adverse – Not Significant

J.8 SUMMARY AND CONCLUSIONS

J.8.1.1 The baseline shows that the key population and human health sensitivities within the Study Area are likely to be the physical environment and health inequalities as summarised in Section J.3.5. As the ES for the Consented Development was undertaken prior to the amendments to the EIA Directive (2014/52/EU) which brought population and human health into the EIA process, it is proposed to undertake a population and human health assessment for all activities associated with the construction of the Proposed Development. In line with best practice, this will include the potential for effects to arise from pre-construction activity.

J.8.1.2 The following determinants of health are proposed to be scoped in for further assessment: physical activity; open space, play and leisure; transport modes, access and connections; community safety; education and training; employment and income; climate change adaptation and mitigation; air quality; and noise and vibration.

APPENDIX K MAJOR ACCIDENTS AND DISASTERS

K. MAJOR ACCIDENTS AND DISASTERS

K.1 INTRODUCTION

K.1.1.1 This section addresses potential major accidents and disasters which could affect people or the environment. It also provides a brief overview of relevant elements of the Proposed Development and details the proposed approach to assessing the likelihood of events occurring, their severity and the likely significance of effects.

K.1.1.2 While safety considerations were assessed as part of the Consented Development and Non-Material Change, there was no standalone Major Accidents and Disasters (MA&D) chapter. Changes to national policy and guidance since the submission of the Consented Development now recommend this topic is included in Environmental Statements in the form of a standalone chapter. Therefore, MA&D will be added as a new separate chapter in the Material Change (MC) ES. As such elements of the Consented Development may be assessed in the MC due to changes in the guidance, and not due to changes in the Proposed Development.

K.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

K.2.1 EIA REGULATIONS

K.2.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[132] (as amended) (Infrastructure EIA Regulations 2017) requires an MA&D Assessment to identify potential significant adverse effects of the Proposed Development on safety and the environment.

K.2.1.2 The identification of likely significant effects requires a combination of sufficient design information and work alongside the design team on hazard identification. The MA&D Assessment activities will be carried out in future stages of the EIA.

K.2.2 CONTROL OF MAJOR ACCIDENT HAZARDS

K.2.2.1 The principal health and safety legislation covering onshore storage of hazardous gases underground is the COMAH Regulations 2015[133]. The COMAH Regulations provides a framework for the regulation of establishments where there is potential for a major accident to people or to the environment to occur. The COMAH Regulations requires the operators to take all measures necessary to prevent major accidents and limit their consequences.

[132] HM Government (2017) *Infrastructure Planning (Environmental Impact Assessment) Regulations*. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made
[133] HM Government (2015) *The Control of Major Accident Hazard Regulations*. Available at: https://www.legislation.gov.uk/uksi/2015/483/contents/made

K.2.2.2 Underground gas storage facilities are within the scope of the COMAH Regulations if the quantity of flammable gas stored meets or exceeds the thresholds in Schedule 1, Part 2 of the Regulations. For hydrogen, this threshold is 5 tonnes (lower-tier) and 50 tonnes (upper-tier). Based on the expected storage capacity, the Proposed Development will be an upper-tier COMAH site.

K.2.2.3 The Proposed Development (i.e. caverns, wells, GPP, SMC3, import and export facilities), will together comprise the COMAH establishment.

K.2.2.4 The COMAH Regulations requires upper-tier sites to prepare a safety report as part of their demonstration that all measures necessary have been taken to prevent major accidents and to limit the consequences to people and the environment of any that do occur.

K.2.2.5 The updated safety report is required to be submitted to the competent authority in a reasonable time before commencing operation (e.g. 3 to 6 months). The report must address the criteria set out in the Safety Report Assessment Manual (SRAM)[134] for technical, predictive, descriptive, environmental and emergency response criteria.

K.2.2.6 The COMAH Regulations also requires upper-tier operators to prepare and test an on-site emergency plan, as well as supplying information to the local authorities and public to enable off-site emergency plans to be developed.

K.2.3 LAND USE PLANNING AND HAZARDOUS SUBSTANCES CONSENT

K.2.3.1 Hazardous Substances Consent (HSC) is required to be obtained from the Hazardous Substances Authority (HSA), typically the Local Planning Authority (LPA), who then must consult the HSE on these applications to consider whether the presence of a significant quantity (referred to as the 'Controlled Quantity') of a hazardous substance is acceptable in a particular location.

K.2.3.2 The application must detail the expected inventory of the identified hazardous substances to be processed, stored and/or transferred (received/offloading/shipped) and expected applicable measures, methods for use/storage/transfer, as prescribed in the HSC application form.

K.2.3.3 In assessing the application for consent, HSE will produce a map with three risk contours (or zones), representing defined levels of risk or harm which any individual would be subject to. Should the HSA grant consent, this map defines the consultation distances within which HSE must be consulted over any relevant future planning applications.

[134] Health and Safety Executive (2015) *Safety Report Assessment Manual (SRAM) – 2015*. Available Online: https://www.hse.gov.uk/comah/sram/docs/comah-sram-2015.pdf

K.2.4 BOREHOLE SAFETY

K.2.4.1 The Boreholes Safety and Operations Regulations 1995[135] and The Offshore Installations and Wells (design and construction etc.) Regulations 1996[136] apply to activities or operations in connection with the extraction of minerals by a borehole, including the construction of caverns in salt formations by solution mining.

K.2.4.2 The regulations include requirements for drilling operations, well maintenance, and other general operations. The regulations require operators to notify the HSE at least 21 days in advance of drilling activities.

K.2.5 OTHER RELEVANT LEGISLATION AND GUIDANCE

K.2.5.1 The following legislation and guidance will be considered and followed (where applicable):

- The IEMA guidance document 'Major Accidents and Disasters in EIA: A Primer'[137];
- The Health and Safety at Work etc. Act 1974 (HSWA)[138];
- The Construction (Design and Management) (CDM) Regulations 2015[139];
- Chemicals and Downstream Oil Industries Forum Guidelines, Environmental Risk Tolerability for COMAH Establishments[140];
- Guidelines for Environmental Risk Assessment and Management (DEFRA, 2011)[141];
- HAZOP and HAZAN: Identifying and Assessing Process Industry Hazards, 1992[142];
- Process Plants – a Handbook for Inherently Safer Design, 2006[143];

[135] HM Government (1995) *Boreholes Safety and Operations Regulations*. Available Online: https://www.legislation.gov.uk/uksi/1995/2038/contents/made
[136] The Offshore Installations and Wells (Design and Construction etc) Regulations 1996. Available Online: The offshore installations and wells (design and construction etc.) regulations 1996 - SPC/Enforcement/170 (hse.gov.uk)
[137] The Institute of Environmental Management and Assessment (2020) *Major Accidents and Disasters in EIA: A Primer.* Available Online: https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer
[138] UK Legislation (1974) *Health and Safety at Work etc. Act*. Available online: https://www.legislation.gov.uk/ukpga/1974/37/contents
[139] UK Legislation (2015) The Construction (Design and Management) Regulations. Available Online: https://www.legislation.gov.uk/uksi/2015/51/contents/made
[140] Chemical and Downstream Oil Industries Forum (2013) Guidelines Environmental Risk Tolerability for COMAH Establishments. Available Online: https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf
[141] Department for Environment, Food and Rural Affairs (2011) Guidelines for Environmental Risk Assessment and Management: Green Leaves III. Available Online: https://www.gov.uk/government/publications/guidelines-for-environmental-risk-assessment-and-management-green-leaves-iii
[142] Trevor A. Kletz (1992) Hazop and Hazan: Identifying and Assessing Process Industry Hazards
[143] Trevor A. Kletz, Paul Amyotte (2010) Process Plants: A Handbook for Inherently Safer Design, Second Edition

- ISO 31000:2009 Risk Management principles and guidelines (The International Standards Organization, 2009)[144];
- Reducing Risks, Protecting People: HSE's decision making process, (HSE, 1999)[145].

K.3 BASELINE ENVIRONMENT

K.3.1 DATA SOURCES - SCOPING

K.3.1.1 The following baseline environmental characteristics of the Study Area have been assessed as part of the wider EIA:

- potential natural hazards which may affect the Proposed Development including meteorological hazards, geological hazards, and other types of hazards.
- existing major accident hazard (MAH) sources that may affect the Proposed Development; and
- sensitive environmental receptors within the Study Area at risk of Major Accidents and Disaster (MA&D) hazards associated with the Proposed Development.

K.3.2 DESCRIPTION

K.3.2.1 The MA&D Assessment will consider all MAHs with potential to cause significant adverse effects on safety and the environment, from the proposed facilities and from 'domino effects' from adjacent sites.

K.3.3 KEY SENSITIVITIES

K.3.3.1 The key sensitivities to be considered in the assessment include:

- population and human heath including public and local communities;
- biodiversity;
- land, soil, water, air, and climate; and
- property and material assets, cultural heritage, and the landscape.

K.3.3.2 The key sensitivities in terms of human, ecological, cultural heritage and other assets are identified and described in the relevant topic sections.

K.4 BASIS OF ASSESSMENT

K.4.1.1 MA&D is a new standalone chapter in the MC and therefore there is no direct comparison between the assessment of the Consented Development and the MC. Elements of MA&D were considered as part of the safety reports provided at that time. The basis for assessment uses the updated guidance for MA&D and considers the material changes of the Proposed Development.

[144] ISO Standards (2009) Risk management — Principles and Guidelines
[145] The Health and Safety Executive (1999) Reducing Risks: Protecting People; HSE's Decision-Making Process

K.4.1.2 The following key infrastructure will be included in the MA&D assessment in the EIA:

- Underground hydrogen storage;
- Processing facilities (GPP);
- SMC3; and
- Venting / Flaring Technology.

K.5 MITIGATION

K.5.1.1 The objective of the MA&D assessment is to demonstrate the vulnerability of the Proposed Development to risks of major accidents and/or disasters which are relevant have been considered. Where appropriate, the assessment will include measures that are envisaged to prevent or mitigate the significant adverse effects of major accidents and/or disasters on people and the environment, together with details of the proposed preparedness and response measures.

K.5.1.2 Through the application of engineering good practice and mitigation measures included in design, it is anticipated that MAH risks associated with the Proposed Development will be adequately managed.

K.6 LIKELY SIGNIFICANT EFFECTS - EIA

K.6.1.1 **Table K.1** lists the new or different likely significant effects for MA&D.

TABLE K.1 - LIKELY SIGNIFICANT EFFECTS

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Loss of containment of hazardous substances such as hydrogen leading to fire / explosion	Materials of construction, Impact protection, Process Control System, Cavity Testing	Hydrogen can form flammable mixtures with air following loss of containment. If ignited this could lead to jet flame or flash fire.	Scope In	HAZID
Domino effects to / from adjacent industrial sites	Plant Layout, Materials of construction, Impact protection, Process Control System, Cavity Testing, Containment Systems	Flammable atmosphere being initiated at one installation and being propagating to the other.	Scoped In	On-site emergency plan, Off-site emergency plan, Domino Report
Seismic Event	No specific mitigations proposed	2013 seismic data was acquired to confirm the suitability of the surveyed area for the Proposed Development. The seismic data was analysed and it was confirmed there is	Scoped Out	N/A

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
		no evidence of faults for the planned locations of the Proposed Development.		
Flooding	No specific mitigations proposed	The Environment Agency's flood map 7 shows that the site is not within any identified likely flood areas. The nearest flood region is to the north of Proposed Development along the banks of the Puddinglake Brook. This flood region is very limited and does not extend much beyond the brook itself.	Scoped Out	N/A
Drilling Hazards	Brine hydraulic pre-test, Nitrogen blanket integrity test, Hydrogen integrity test	High	Scoped In	
Lightning	Standards related to lightning protection will be provided at a later	High	Scoped In	

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
	stage of the project			
Security	Security fencing, CCTV, Access Control. Details of the security measures at the wellheads will be provided in the Pre-Operational Safety report once available.	High	Scoped In	Pre-Operational Safety Report

K.6.1.2 Likely significant effects have been identified as based on the present understanding of the Proposed Development. However, to fully understand the likely significant effects requires a combination of sufficient design information and working alongside the design team on hazard identification. These activities will be carried out in future stages of the EIA.

K.7 EFFECTS SCOPED OUT OF THE EIA

K.7.1.1 The MA&D Assessment will cover the construction and operation phases of the Proposed Development. However, only significant adverse safety or environmental effects will be considered. For example, typical health and safety hazards associated with construction will not be included in the assessment (although those related to traffic, airborne dust and contaminated land will be addressed by other EIA topics). Hazards arising during the decommissioning phase of the Proposed Development will be considered comparable to those that will be experienced during the construction period.

K.8 PROPOSED APPROACH TO ASSESSMENT

K.8.1.1 Hazard Identification studies will be carried out during the early design stage for all aspects of the Proposed Development where there is potential for a major accident to people or to the environment. The objective of these studies will be to identify major accident hazards, assess risk levels and define preventative and mitigative control measures. The studies will cover the construction and drilling phases to the extent necessary but will focus on operation of the Proposed Development. Further detailed hazard and risk assessment studies will be required and undertaken at later design stages.

K.8.2 SPECIFIC METHODOLOGIES

K.8.2.1 The MA&D Assessment will be carried out using a Hazard Identification (HAZID) study methodology which includes identification of sources / pathways / receptors, an assessment of the worst-case credible safety and environmental consequences and documenting of the planned measures to prevent or mitigate the undesirable events.

K.8.2.2 The following section describes the key steps in the HAZID study process.

Step 1: Select Hazard Category and Guideword

- Select a hazard category and guideword from a checklist, which will be developed in accordance with industry standards, to ensure all potential hazards are identified.

Step 2: Select Hazard Category and Guideword

- For each hazard category and guideword, all potential sources (i.e., cause of the hazard) with potential to cause significant harm will be

identified. Pathways (i.e., the route by which the source can reach the receptor) and receptors (i.e. specific component of the environment that could be adversely affected) will be assessed.

- At this stage, screening will be carried out to assess whether the source and pathway could result in a hazard which was deemed significant and therefore whether it will be assessed further as part of the MA&D Assessment.
- The process of identifying MA&D hazards will include a review of previous incidents and will be based on the experience of technical safety consultants with experience in each of the sectors relevant to the Proposed Development

Step 3: Develop Consequences

- The 'worst case credible' consequences of the undesirable event will then be evaluated and recorded. The unmitigated consequences (without giving credit to mitigations) will be documented.
- The assessment will apply Rochdale Envelope principles, which involves assessment of the reasonable worst-case credible MA&D risks and consequences associated with the Proposed Development. This conservative methodology establishes the worst-case scenarios, the risk of which should be reduced to a level that is ALARP during the detailed design, construction planning and operation of the Proposed Development.
- The HAZID study will utilise the output of hazard and risk assessments carried out during the Pre-FEED stage including consequence modelling.

Step 4: Risk Rank without Mitigations

- Risk ranking will be carried out by combining the severity and estimated likelihood using a risk matrix. The risk ranking will initially be carried out without safeguards to assess the unmitigated risk.

Step 5: identify Mitigations

- Mitigations will be documented for the identified sources and consequences. At the MA&D assessment stage of the Proposed Development, safety and control systems will not have been fully designed. However, good practice industry approaches to managing risk will be used. In addition, equipment such as process monitoring, safeguarding systems and embedded mitigation will be provided as required.

Step 6: Risk Rank with Mitigations

- Risk ranking will be carried out with mitigation in place to determine the mitigated risk.

Step 7: Define Specific Requirements to Achieve Mitigations

- Where the HAZID team identifies a requirement that would need to be developed into a mitigation in the subsequent phases of the Proposed Development, these will be documented.

K.8.3 ASSESSMENT CRITERIA

K.8.3.1 The following factors will be considered in determining whether potential adverse effects are 'significant':

- The geographic extent of the effects: effects beyond the Proposed Development boundaries are more likely to be considered significant.
- The duration of the effects: effects which are permanent (i.e. irreversible) or long lasting are more likely to be considered significant.
- The severity of the effects in terms of number, degree of harm to those affected and the response effort required: effects which trigger the mobilisation of substantial civil emergency response effort are likely to be considered significant.
- The sensitivity of the identified receptors: significant effects are more likely to result for receptors that are less able to avoid, adapt to or tolerate an impact.
- The effort required to restore the affected environment: effects requiring substantial clean-up or restoration efforts are likely to be considered significant.

K.8.3.2 The assessment will use the risk matrix in to categorise threats and hazards, based on severity of the consequence and likelihood.

K.8.3.3 Severity of the consequence of a hazard or threat will be determined on the basis of a reasonably foreseeable worst-case safety and environmental effects of the event. The likelihood of the hazard or threat occurring will be determined based on the likelihood of the cause, taking into account the source-pathway-receptor linkage.

K.8.3.4 The combination of severity and likelihood will provide an estimate of the risk. The risk is estimated first without proposed embedded mitigation. The risk is then estimated with proposed embedded mitigation in place.

K.8.3.5 The risk is categorised using the matrix in **Table K.1** which has three regions:

- Tolerable - risks that are considered to be acceptable and require no further assessment;
- Tolerable if ALARP (TifALARP)- risks that are tolerable if demonstrated to be "As Low as Reasonably Practicable";
- Management Review – risks that require further review and additional measures identified. For new facility, identified risks should not fall within this region;
- Intolerable - risks which are considered to be intolerable. These risks must be analysed in more detail and/ or additional risk reduction measures identified.

K.8.3.6 Risks categorised as 'broadly acceptable' and 'tolerable if ALARP' (with mitigation in place) are not considered to have significant

environmental effects; a risk categorised as extreme (with mitigation in place) would have a significant environmental effect. This is as shown in **Table K.2** below.

TABLE K.2 - RISK CATEGORISATION

1 - LOW RISK	Acceptable	Environmental effect - not significant
2 - Medium Risk	Tolerable if ALARP	Environmental effect - not significant
3 - High Risk	Tolerable if ALARP	Environmental effect - not significant
4 - Extreme Risk	Unacceptable	Environmental effect - significant

K.8.3.7 It is noted that the MA&D assessment will not constitute a formal ALARP demonstration and any inferred alignment between the ALARP regions and the levels of risk claimed is purely indicative, due to the early stage of the design.

TABLE K.3 - RISK ACCEPTANCE MATRIX

Consequence	Event Frequency.							
	Extremely Unlikely	Very Unlikely	Unlikely	Quite Unlikely	Somewhat Unlikely	Fairly Probable	Probable	Likely
Category 6 Disaster								
Category 5 Extremely Serious Consequences								
Category 4 Major Consequences								
Category 3 Severe Consequences								
Category 2 Serious Consequences								
Category 1 Significant Consequences								

K.9 SUMMARY AND CONCLUSIONS

K.9.1.1 The MA&D is a new standalone chapter in the MC and therefore there is no direct comparison between the assessment of the Consented Development and the MC. Elements of MA&D were considered as part of the safety reports provided at that time. The basis for assessment uses the updated guidance for MA&D and considers the material changes of the Proposed Development.

K.9.1.2 Likely significant effects have been identified as based on the present understanding of the Proposed Development. However, to fully understand the likely significant effects requires a combination of sufficient design information and working alongside the design team on hazard identification. These activities will be carried out in future stages of the EIA.

APPENDIX L WASTE

L. WASTE

L.1 INTRODUCTION

L.1.1.1 This chapter details the baseline conditions, potential effects, mitigation and assessment methodology with respect to waste generation and management for the Proposed Development. The potential effects of the Proposed Development in the context of waste have been identified through a technical review of the current design, construction, operational and decommissioning principles of the Proposed Development.

L.1.1.2 The assessment will especially focus on the potential for waste generated in the construction and operational phase of the Proposed Development to present risks to receptors, or to the risk of exceeding the planned landfill capacity in the Cheshire region.

L.1.1.3 While waste was considered in the Consented Development and Non-Material Change, there was no standalone chapter for this topic. Changes to national policy and guidance since the submission of the Consented Development now recommend waste is included in Environmental Statements in the form of a standalone chapter. Therefore, waste will be added as a new separate chapter in the Material Change (MC) ES. As such elements of the Consented Development may be assessed in the MC due to changes in the guidance, and not due to changes in the Proposed Development.

L.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

L.2.1 OVERVIEW

L.2.1.1 Key items of legislation, policy and guidance specifically relevant to waste generation and management for the Proposed Development are as follows:

- The Control of Pollution (Amendment) Act 1989[146];
- Waste (England and Wales) Regulations (2011)[147];
- Waste (England and Wales) (Amendment) Regulations 2014[148];
- Controlled Waste (England and Wales) Regulations 2012[149];
- The Hazardous Waste (England and Wales) Regulations 2005[150];

[146] Control of Pollution (Amendment) Act, 1989. Available at: https://www.legislation.gov.uk/ukpga/1989/14/contents
[147] The Waste (England and Wales) Regulations, 2011. Available at: https://www.legislation.gov.uk/uksi/2011/988/contents
[148] The Waste (England and Wales) (Amendment) Regulations, 2014. Available at: https://www.legislation.gov.uk/uksi/2014/656/contents/made
[149] The Controlled Waste (England and Wales) Regulations, 2012. Available at: https://www.legislation.gov.uk/uksi/2012/811/contents
[150] The Hazardous waste (England and Wales) Regulations, 2005. Available at: https://www.legislation.gov.uk/uksi/2005/894/contents

- National Policy Statements (including NPS for Overarching Energy (EN-1)[151];
- National Planning Policy for Waste[152];
- Waste Management Plan for England 2021[153];
- Cheshire West and Chester Council (CWAC) Local Plan[154] (Part One) and (Part Two);
- The Definition of Waste: Development Industry Code of Practice (DoW: CoP)[155]; and
- Institute of Environmental Management and Assessment (IEMA) Guide to Material and Waste in EIA[156].

L.2.1.2 Regulatory requirements relating to management of wastewater are discussed in **Technical Appendix B, Hydrology and Flood Risk**.

L.3 BASELINE ENVIRONMENT

L.3.1 STUDY AREA

L.3.1.1 For the purpose of this topic, the Study Area is considered to be the Cheshire sub-region, and more specifically the CWAC district, as used in the Department for Environment, Food and Rural Affairs' (Defra) and Environment Agency (EA) waste datasets.

L.3.2 DATA SOURCES - SCOPING

L.3.2.1 For the purpose of this Scoping Report, existing baseline data for the Cheshire sub-region, including landfill capacity, annual volume and nature of waste, has been sourced from Defra's Waste Data Interrogator and Waste Summary Tables for England[157] and the EA's Remaining Landfill Capacity[158] online datasets.

L.3.2.2 The ES will present more detailed information on the baseline waste aspects of the Proposed Development, once further design information is available on the likely nature and volumes of waste which will be generated during each phase of the Proposed Development. The most

[151] National Policy Statements for Energy Infrastructure, 2023 (revised 2024). Available at: https://www.gov.uk/government/collections/national-policy-statements-for-energy-infrastructure
[152] National Planning Policy for Waste, 2014 Available at: https://www.gov.uk/government/publications/national-planning-policy-for-waste/national-planning-policy-for-waste
[153] Waste Management Plant for England, 2021. Available at: https://www.gov.uk/government/publications/waste-management-plan-for-england-2021
[154] Cheshire West and Chester Local Plan Part 1 (adopted 2015) and Part 2 (adopted 2019). Available at: https://consult.cheshirewestandchester.gov.uk/kse/folder/59487
[155] CL:AIRE, Definition of Waste: Development Industry Code of Practice (DoW: CoP), version 2, 2011. Available at: https://claire.co.uk/projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document
[156] Institute of Environmental Management and Assessment Guide to Material and Waste in EIA, 2020. Available at: https://www.iema.net/media/0t5fwyhj/iema-materials-and-waste-in-eia-march-2020.pdf
[157] Department for Environment, Food and Rural Affairs (DeFRA) Waste Data Interrogator and Waste Data Tables for 2023. Available at: https://environment.data.gov.uk/dataset/134f7ce9-5123-4813-b4e5-c4fdf621200d
[158] Environment Agency, September 2024, Remaining Landfill Capacity 2023. Available at: https://www.data.gov.uk/dataset/237825cb-dc10-4c53-8446-1bcd35614c12/remaining-landfill-capacity1

significant impacts in relation to waste are anticipated to occur during the construction phase.

L.3.3 DESCRIPTION

L.3.3.1 The baseline conditions for the assessment will establish the projected total volume and the existing volume of waste materials received by registered landfills in the Cheshire sub-region. This information will provide a baseline to assess the effects of construction, operation and decommissioning of the Proposed Development on the available landfill capacity, and the volume of waste delivered to receiving landfills annually.

L.3.3.2 A desktop review will provide information on the distance and capacity of registered landfills to determine facilities local to the Proposed Development.

Existing Landfill Capacity and Inputs

L.3.3.3 The number of operational landfill facilities in the Cheshire sub-region as of 2023 is shown in **Table L.1**.

TABLE L.1 - OERATIONAL LANDFILL FACILITIES IN THE CHESHIRE SUB-REGION (2023)

	Cheshire Sub-Region	**Cheshire West & Chester (CWAC) District**	**Other Cheshire Districts**
Number of operational landfill facilities	10	3	7

L.3.3.4 The locations of the operational landfill facilities within the Cheshire sub-region and the CWAC district are shown in **Table L.2**:

TABLE L.2 - OPERATIONAL LANDFILL FACILITY LOCATIONS

Facility address	**Planning Region**	**Planning Sub-Region**	**Local Authority District**	**Site Type**
CWAC District				
Holford Brinefield Landfill Site, Lostock Gralam, CW9 7TD	Northwest	Cheshire	CWAC	L04 – Non-Hazardous
Frodsham Marsh Lagoons	Northwest	Cheshire	CWAC	L05 – Inert

Facility address	Planning Region	Planning Sub-Region	Local Authority District	Site Type
Huntington Water Treatment Works	Northwest	Cheshire	CWAC	L05 – Inert
Wider Cheshire Sub-Region				
Maw Green Landfill, Maw Green Lane, Crewe, CW1 5NG	Northwest	Cheshire	Cheshire East	L04 – Non-Hazardous
Hilltop Farm Brinefields, Warmingham, CW10 0HQ	Northwest	Cheshire	Cheshire East	L04 – Non-Hazardous
Eardswick Hall Landfill Site, Minshull Vernon, Crewe, CW1 4RQ	Northwest	Cheshire	Cheshire East	L01 - Hazardous
Risley Landfill, Silver Lane, Warrington, WA3 6BY	Northwest	Cheshire	Warrington	L04 – Non-Hazardous
Woolston Deposit Grounds	Northwest	Cheshire	Warrington	L07 – Restricted
Rixton Landfill, Moss Side and Fir Tree Farms, Rixton, Warrington, WA3 6EN	Northwest	Cheshire	Warrington	L04 – Non-Hazardous
Southworth Quarry Landfill, Winwick Lane, Winwick, Warrington, WA3 7EW	Northwest	Cheshire	Warrington	L05 – Inert

L.3.3.5 The total remaining landfill capacity for the CWAC district and the wider Cheshire sub-region is shown in **Table L.3**:

TABLE L.3 - REMAINING LANDFILL CAPACITY (END 2023)

	Remaining Capacity (m^3, end 2023)				
	Hazardous	Non-Hazardous (SNRHW)	Non-Hazardous	Restricted	Inert
CWAC District	19,690	-	1,107,244	-	Data unavailable
Cheshire Sub-Region (Total)	1,371,914	-	4,172,116	Data unavailable	747,473

SNRHW = stable, non-reactive hazardous waste

L.3.4 KEY SENSITIVITIES

L.3.4.1 Registered landfill sites used by the Proposed Development may be affected by construction, operation and decommissioning works through a material increase in the volume of waste types received. This is most likely to occur during the construction and decommissioning phase of the Proposed Development, where projected waste volumes are expected to be the highest.

L.3.4.2 Residential receptors on the routes from the Proposed Development to the landfill facilities used are not considered to be to be different that that considered within the Consented Development and therefore have been scoped out in **Technical Appendix E, Traffic and Transport**.

L.3.4.3 At the point of generation, handling and storage of waste may affect soils, surface and groundwater receptors on land used by the Proposed Development during construction and operation. Potential effects of waste on soils and groundwater resources are addressed in **Technical Appendix A, Geology and Ground Conditions** and on surface water resources, including from wastewater discharges, in **Technical Appendix B, Hydrology and Flood Risk**.

L.4 BASIS OF ASSESSMENT

L.4.1.1 Waste is a new standalone chapter in the MC and therefore there is no direct comparison between the assessment of the Consented Development and the MC. Elements of Waste were considered as part of the Geology, Land and Water Quality chapter provided at that time. The basis for assessment uses the updated guidance for Waste and considers the material changes of the Proposed Development.

L.4.2 CONSTRUCTION

L.4.2.1 The greatest potential for impacts regarding waste management will be during the construction phases from activities including:

- Site preparation, levelling and possible generation of surplus soil and subsoil that need to be removed from the site;
- Excavations and piling generating surplus soil;
- General construction activities; and
- Potential encounters with contaminated soils.

L.4.2.2 The majority of construction wastes are likely to be as surplus site preparation and excavation material. Other construction waste types will be generated in smaller quantities.

L.4.2.3 The changes to the Proposed Development from the Consented Development are not anticipated to materially impact the nature of waste generated during construction. The disposal route of brine will not change and will be discharged as per the Consented Development. Minor changes to the volume of waste produced during the construction of above ground infrastructure may be anticipated due to the removal of the NTS, change to SMC3 and increase in size of the GPP, however, this is not considered to change the impact from waste compared to the Consented Development and mitigation remains the same. The construction methods of and the number of caverns remain the same as the Consented Development and therefore will not be materially different in terms of nature and volume of waste from solution mining activities. Where the elements of waste surplus have not been assessed through the Consented Development, such as the burden of regional capacity on landfill sites, these will be considered in the waste assessment in the MC ES.

L.4.2.4 This Chapter deals with solid wastes only. Potential effects associated with wastewater discharges arising from the development are considered in **Technical Appendix B, Hydrology and Flood Risk.**

L.4.3 OPERATION AND MAINTENANCE

L.4.3.1 Wastes arising during operation will be significantly less in volume than those during construction but may include materials that require specialist treatment and disposal.

L.4.3.2 It is considered that changes associated with operation of the Proposed Development are not anticipated to give rise to effects that would be materially different to those described in the ES for the Consented Development. Where the elements of waste surplus have not been assessed through the Consented Development, these will be considered in the waste assessment in the MC ES.

L.4.4 DECOMMISSIONING

L.4.4.1 Decommissioning will take place after an anticipated 40 years of operation and will consider the legal requirements at the time and be undertaken in accordance with a decommissioning plan approved by

the relevant regulatory authority. It is anticipated that application of the waste management hierarchy will be at the core of a future decommissioning plan. Decommissioning is therefore not considered further in this chapter.

L.5 MITIGATION

L.5.1.1 Mitigation measures that will be adopted with respect to waste generation and handling will largely comprise standard industry practice focused on the principles for implementing the Waste Hierarchy, seeking to minimise the volume of waste sent to landfill. A review of the mitigation measures outlined in the Consented Development will be undertaken.

L.5.2 CONSTRUCTION

L.5.2.1 As noted in the Consented Development, during the construction phase of the Proposed Development, the Principal Contractor will be required to develop and implement a construction phase Waste Management Plan (WMP). This document will include reference to guidance provided by The Waste and Resources Action Programme (which operates as WRAP), in the re-use of materials and promoting the circular economy.

L.5.2.2 The disposal of waste, including any surplus spoil, will be managed as far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal in accordance with the relevant waste management regulations, e.g. Environmental Permitting Regulations 2016. The DoW: CoP will be employed to promote the re-use and repurposing of soils wherever possible.

L.5.2.3 The majority of waste general construction materials is expected to be recycled by the construction Principal Contractor, in line with the construction phase WMP. Non-recyclable waste will be disposed of offsite, avoiding landfilling where possible.

L.5.2.4 Should any contamination be encountered, all contaminated materials will be characterised both chemically and physically in line with BS EN 14899:2005 'Characterisation of Waste - Sampling of Waste Materials' to classify the waste and ensure correct disposal. Encountering contaminated soils is considered in **Technical Appendix A, Geology and Ground Conditions**.

L.5.2.5 With regards to the temporary storage of waste materials on site during construction, designated, bunded and appropriately surfaced areas will be constructed to manage the risks of migration of contaminants to receptors in line with industry standards, as will be set out in the construction phase WMP.

L.5.3 OPERATION AND MAINTENANCE

L.5.3.1 The operational processes for the Proposed Development are being designed in accordance with Best Available Techniques (BAT), such

that the generation of solid wastes during operation is minimised or avoided altogether (where possible). Some special solid wastes, such as spent filters and ion exchange resins, cannot be avoided and are anticipated to be produced on a sporadic basis. The framework for managing waste during the operational phase of the Proposed Development will be included within an Environmental Management System (EMS).

L.5.3.2 The disposal of operational waste will be managed as far as is reasonably practicable to reduce any adverse environmental effects of disposal in accordance with the relevant waste management regulations, as will be outlined in the EMS.

L.6 LIKELY SIGNIFICANT EFFECTS - EIA

L.6.1.1 The likely significant effects for Waste are listed in **Table L.4**, below.

TABLE L.4 - LIKELY EFFECTS - WASTE MANAGEMENT

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
Handling and disposal of excess soils generated during construction placing a burden on regional landfill capacity	Implementation of principles set out in the Waste Hierarchy	Minor	In	Not considered in the Consented Development ES. Update and confirm landfill capacities. Assess options to re-use excess soils under the DoW: CoP.
Handling and disposal of construction wastes generated during construction placing a burden on regional landfill capacity	Implementation of principles set out in the Waste Hierarchy	Minor	In	Not considered in the Consented Development ES. Update and confirm landfill capacities. Confirm likely waste streams and identify options for re-use/recycling.
Handling and disposal of operational phase wastes placing a burden on regional landfill capacity	Implementation of principles set out in the Waste Hierarchy	Negligible - operational phase waste volumes will be significantly less than	In	Not considered in the Consented Development ES. Update and confirm landfill capacities. Confirm likely waste types and planned

Proposed Development Activity	Mitigation Measures	Likely Significance of Effect	Proposed Approach to Assessment (Scoped In or Out)	Further Baseline Data Requirements
		construction phase.		waste minimisation measures.
Handling and disposal of decommissioning phase wastes placing a burden on regional landfill capacity	Implementation of principles set out in the Waste Hierarchy	Minor	Out – 40 years in the future. Will be undertaken in line with legal requirements at the time. Effects considered no more than construction.	N/A

L.7 EFFECTS SCOPED OUT OF THE EIA

L.7.1.1 While an effect may be proposed to be scoped out, the ES will still provide baseline information on the receptor(s) concerned and set out any relevant measures the Proposed Development will adopt to mitigate impacts on the receptor(s).

L.7.1.2 Assessing the effects on landfill capacity for the decommissioning phase is scoped out. This phase is unlikely to generate large volumes of inert material (e.g. soils) and the majority of surface equipment will be dealt with in accordance with the waste hierarchy, with a considerable proportion (metallic materials, electrical cables etc.) amenable to recycling. Effects are considered to be no more than during the construction phase.

L.8 PROPOSED APPROACH TO ASSESSMENT

L.8.1 PROPOSED DEVELOPMENT WASTE GENERATION

L.8.1.1 The effects of waste generated during construction at the Site will be assessed by:

- Establishing the baseline for regional landfill capacity for inert, non-hazardous, stable non-reactive hazardous, and hazardous waste types;
- Estimating the likely quantity of:
  - Surplus excavation material and construction-derived waste likely to be generated during the construction phase of the Proposed Development site using benchmark waste data. Estimated waste composition data will be derived from new build industrial buildings published by Waste and Resources Action Programme (WRAP) (WRAP, 2009). Total provisional construction waste volumes will be estimated using Smartwaste Waste Benchmark Data, based on the development footprints for the various elements of the Proposed Development.;
    - General wastes likely to be generate during operation of the Proposed Development; and
    - The approximate percentages of these materials classified as the relevant waste types (assuming a worst-case scenario); and
- Comparing the likely quantities of waste generated by the Proposed Development to the baseline landfill capacity to assess the effect on the capacity and ability of landfill sites to accept the waste.

L.8.1.2 The assessment will consider a worst case, assuming it is not possible to retain or reuse any excavated materials on site, and therefore it will require landfill disposal.

L.8.2 ASSESSMENT CRITERIA

L.8.2.1 In order to assess the significance of the Proposed Development on the baseline landfill capacity, the following significance criteria are applied, in line with IEMA guidance[156]:

TABLE L.5 - EVALUATION OF THE SIGNIFICANCE OF THE PROPOSED DEVELOPMENT ON LANDFILL CAPACITY

Significance of Effect	Criteria for Effects of Waste Generated during Construction and/or Operational Phases	
	Inert / Non-Hazardous Waste	Hazardous Waste
Negligible (Not Significant)	Waste generated by the development will reduce regional landfill capacity by <1%	Waste generated by the development will reduce regional landfill capacity by <0.1%
Minor (Not Significant)	Waste generated by the development will reduce regional landfill capacity by 1 - 5%	Waste generated by the development will reduce regional landfill capacity by 0.1 – 0.5%
Moderate (Significant)	Waste generated by the development will reduce regional landfill capacity by 6 - 10%	Waste generated by the development will reduce regional landfill capacity by 0.5 - 1%
Major (Significant)	Waste generated by the development will reduce regional landfill capacity by >10%	Waste generated by the development will reduce regional landfill capacity by >1%

L.9 SUMMARY AND CONCLUSIONS

L.9.1.1 The nature and volume of waste generated by the Proposed Development is not anticipated to be materially different from that in the Consented Development. However, waste was not considered as a standalone chapter in the Consented Development ES, and as such effects including impact on regional landfill capacity were not assessed at that time. Therefore, the waste chapter of the MC ES proposes to assess effects of waste generation of the Proposed Development on landfill capacity, in line with current guidance.

APPENDIX M CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

M. CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

M.1 INTRODUCTION

M.1.1.1 This chapter sets out the scope and methodology for assessing the impact of climate change on the Proposed Development (the 'GHG assessment'); and the impact of the Proposed Development on climate change (the 'climate resilience assessment'). The chapter also sets out the approach to the 'in-combination climate change impact assessment'.

M.2 GHG ASSESSMENT

M.2.1 INTRODUCTION

M.2.1.1 This chapter sets out the methodology for identifying the greenhouse gas (GHG) emissions (the 'GHG assessment') of the Proposed Development.

M.2.1.2 Subsequently, a GHG assessment will be completed as part of the PEIR and ES to measure the GHG emissions associated with the Proposed Development to identify the mitigation measures to reduce the GHG emissions and therefore reduce the impact of the Proposed Development on climate change.

M.2.1.3 Since the Consented Development was submitted there has been a change in planning legislation with the introduction of a GHG assessment as part of the EIA Regulations. This chapter describe the methods that will be used to undertake the GHG assessment and comply with the regulatory requirements.

M.2.1.4 The Proposed Development is a critical element of the HyNet consortium of hydrogen generation and supply in the Northwest and North Wales which aims to support regional and national net zero commitments by providing hydrogen storage as an alternative to gas storage. **Chapter 1, Introduction** and **Chapter 3 Planning and Policy Context** set out the overall impact of the HyNet consortium in terms GHG emissions and the impact on climate change.

M.2.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

M.2.2.1 The following legislation and policy requirements that are relevant to the GHG assessment involve:

- Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations') sets out the requirement to consider climate change within EIA assessment and decision-making processes: "A description of the likely significant effects of the development on the environment resulting from… the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".

- The National Planning Statement (NPS) for Energy (EN-1) Section 5.3 sets out the requirements for a GHG assessment of the whole life GHG impacts from construction, operation and decommissioning, and an explanation of how these have been mitigated at every stage.
- The Climate Change Act 2008 is the UK Government's legislation for addressing climate change. In relation to climate change mitigation, it commits the UK to GHG emissions reductions and reporting. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 sets the UK's net zero target by 2050.
- Cheshire West and Chester Local Plan 2015 supports the creation of infrastructure that promotes 'green infrastructure' that addresses climate change by designing and constructing infrastructure that mitigates and adapts to climate change.

M.2.3 BASELINE ENVIRONMENT

Study Area

M.2.3.2 The Proposed Development is located in open countryside which is predominantly arable. The Proposed Development is located in the Chester area in the Northwest of England and is shown on **Figure 1.1**. The Proposed Development involves the construction, operation and decommissioning of 19 hydrogen storage salt caverns with associated infrastructure (**Chapter 2, Proposed Development Description**, provides full details of the Proposed Development).

M.2.3.3 GHG emissions will be considered throughout the construction, operation and decommissioning stages of the Proposed Development.

M.2.3.4 The key activities of the Proposed Development that will generate GHG emissions are likely to include:

- Construction (proposed to be undertaken over an 12-year period): This includes the extraction, manufacture and transport of materials to the Proposed Development; as well as the emissions associated with the construction processes on site (including fuel consumption of construction and installation equipment and vehicles; electrical pumps used for sub-surface work during construction; and construction waste management).
- Operation (proposed to commence following construction, of phase 1,in year 6): The GHG emissions associated with the operation of the Proposed Development will involve fuel consumption related to the maintenance equipment and vehicles used; the electrical supply during operations as well as the vented hydrogen and fugitive emissions.
- Decommissioning: This will involve the GHG emissions associated with the fuel consumption of plant, machinery and vehicles during the decommissioning phase.

Data Sources - Scoping

M.2.3.5 The GHG assessment will be prepared in accordance with the UK Government's environment reporting guidelines (BES, March 2019)[159]; the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (revised edition)[160] developed by the World Resources Institute and the World Business Council for Sustainable Development (2004); and ISO14064-1:2018 Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals[161].

M.2.3.6 The GHG assessment will also use the most up-to-date conversion factors as detailed by non-financial reporting guidance and specifically the UK Government Department for Energy Security and Net Zero (DESNZ) conversion factors for company reporting[162] and the UK Government's electricity emission factors to 2100 which are part of its Green Book appraisal guidance (DESNZ, 2023)[163].

M.2.3.7 The methodology used in the GHG assessment will be guided by the Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating the Significance (IEMA, 2022)[164].

M.2.4 BASIS OF ASSESSMENT - BASELINE

M.2.4.1 The baseline is the reference against which the GHG emissions associated with the Proposed Development will be compared and assessed.

M.2.4.2 A suitable baseline will be identified to understand the scale of the impact of the GHG emissions associated with the Proposed Development. This will involve the baseline associated with the Consented Development.

M.2.5 PROPOSED APPROACH TO ASSESSMENT

M.2.5.1 The GHG assessment will identify and calculate the GHG emissions associated with the construction, operation and decommissioning of the Proposed Development.

M.2.5.2 The GHG emissions will be classified in accordance with best practice GHG reporting into the following categories:

[159] UK Government's Environment Report Guidelines, BES, 2019. Available at: Environmental Reporting Guidelines
[160] Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Version). Available at: ghg-protocol-revised.pdf
[161] ISO14064-1: 2018 Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals. Available at: ISO 14064-1:2018 - Greenhouse gases
[162] UK Government Department for Energy Security and Net Zero (DESNZ) Conversion Factors for Company Reporting. Available at: Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK
[163] UK Government's Electricity Emission Factors to 2100 Which are Part of its Green Book Appraisal Guidance. Available at: The Green Book (2022) - GOV.UK
[164] Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating the Significance, IEMA, 2022. Available at: eia-guide_ghg-assessment-and-significance_iema_16may17.pdf

- Scope 1 GHG emissions (direct): GHG emissions that arise from sources that are owned or controlled by the Proposed Development such as consumption of oil, gas and biomass to generate electricity, for use in vehicles, plant or machinery and fugitive emissions (for example sulphur hexafluoride (SF6)) from equipment.
- Scope 2 GHG emissions (indirect): GHG emissions from the generation of purchased electricity, heat and steam. This can involve electricity consumed in buildings, plant and machinery.
- Scope 3 GHG emissions (indirect): GHG emissions that occur as a consequence of the activities of the Proposed Development but occur from sources not owned or controlled by the Proposed Development. For instance, fuel and energy associated with the extraction, refining and transport of raw materials; the fuel used in third party vehicles and for business travel; and the gas sold to customers.

M.2.5.3 The GHG assessment will report the GHG emissions in tonnes of carbon dioxide equivalent (tCO2e). To calculate the tCO2e the following methodology will be used:

- Activity data x GHG emissions factor = GHG emissions (tCO2e)

M.2.5.4 Where feasible, activity data will be gathered from primary sources such as the quantity of materials used, wastes generated, or distances travelled. The activity data will then be multiplied by the most appropriate conversion factor. The individual quantification calculations are then summed to form a total GHG emission inventory for the project and its activities. The GHG calculations and inventory will be presented in an appendix to the PEIR and ES.

M.2.5.5 Where data is not available, alternative approaches would be taken using generic or publicly available information that best represents the projects and its activities.

M.2.5.6 The emissions associated with the Proposed Development will be assessed against the baseline to provide a comparison of the impact of the Proposed Development on the climate.

M.2.5.7 In some cases, there will be exceptions to the stated boundaries and methods detailed above. Any activities representing under 1% of the total GHG assessment emissions will be considered de-minimis.

M.2.6 LIKELY SIGNIFICANT EFFECTS - EIA

M.2.6.1 The Proposed Development has the potential to release GHG emissions during its construction, operation and decommissioning.

M.2.6.2 For the GHG assessment it is considered that any change in GHG emissions has the potential to impact climate change.

M.2.6.3 The Proposed Development will support the generation and transmission of low carbon electricity as part of the HyNet consortium and therefore will provide a benefit assuming that it will reduce GHG

emissions from fossil fuels. This is described in detail in the Planning Statement and **Chapter 3, Planning and Policy Context**.

M.2.7 EFFECTS SCOPED OUT OF EIA

M.2.7.1 Due to the potential for GHG emissions to be associated with the construction, operation and decommissioning of the Proposed Development there have been no specific impacts scoped out.

M.2.8 MITIGATION

M.2.8.1 Once the GHG assessment has been completed, the PEIR and ES will identify opportunities for mitigating the GHG emissions in the construction, operation and decommissioning of the Proposed Development.

M.2.9 SUMMARY AND CONCLUSIONS

M.2.9.1 Since the Consented Development was submitted there has been a change in planning legislation with the introduction of a GHG assessment as part of the EIA Regulations.

M.2.9.2 This chapter summarised the methods and approach of the GHG assessment for the Proposed Development. Once complete the GHG assessment will consider the level of significance of the GHG emissions and understand the opportunities for them to be reduced with suitable mitigations.

M.2.9.3 The PEIR and ES will present the GHG assessment for the Proposed Development and describe the suitable mitigations to reduce the impact of the Proposed Development on climate change.

M.3 CLIMATE RESILIENCE ASSESSMENT

M.3.1 INTRODUCTION

M.3.1.1 This section sets out the approach for assessing the impact of climate change on the Proposed Development.

M.3.1.2 Since the Consented Development was submitted there has been a change in planning legislation with the introduction of an assessment of the vulnerability of the Proposed Development to climate change.

M.3.1.3 The PEIR and ES will therefore assess the impact of climate change on the Proposed Development and understand the suitable adaptation measures required to ensure the Proposed Development is resilient to future climate change.

M.3.2 TOPIC-SPECIFIC REGULATORY REQUIREMENTS AND GUIDANCE

M.3.2.1 The requirement to consider a project's impact on climate results from Schedule 4 of the EIA Regulations which require:

- "A description of the likely significant effects of the development on the environment resulting from… the impact of the project on

climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".

M.3.2.2 The Climate Change Act 2008 and the Climate Change Act (2050 Target Amendment) Order 2019 commit the UK to reducing emissions to net zero by 2050 and set out the requirement for the UK Government to develop a National Adaptation Programme to manage the effects of climate change.

M.3.2.3 Additionally, national planning policy requires that proposed developments assess vulnerability to climate change impacts and ensure that adaptation measures are in place to ensure that the development is resilient to future climate risks.

M.3.2.4 The Cheshire West and Chester Local Plan 2015 supports the creation of infrastructure that promotes 'green infrastructure' that addresses climate change by designing and constructing infrastructure that mitigates and adapts to climate change.

M.3.3 BASELINE ENVIRONMENT

Study Area

M.3.3.2 This Proposed Development (described in detail in **Chapter 2, Proposed Development Description** and shown in **Figure 1.1**), located in the Holford Brinefields, Cheshire, is characterised as open countryside supporting mainly dairy farming. The site is relatively flat plain with strong hedgerow pattern and low settlement density.

M.3.3.3 The Proposed Development is in the sub-catchment of Puddinglake Brook, a tributary of the River Dane to the west of the site. The topography is very low gradient and supports numerous ponds. The main rivers are Puddinglake Brook, Crow/Wade Brook, Wincham Brook, Dane, Wheelock and Mersey.

M.3.3.4 The location is based in temperate climate region and the baseline water stress level at the site is classed as low by the World Resources Institute Water Risk Atlas.

Data Sources - Scoping

M.3.3.5 The climate resilience assessment will analyse climate data by UK Met Office climate projections for the UK in 2018 (UKCP18)[165]; EA Flood maps; and Climate data generated by the Intergovernmental Panel on Climate Change.

M.3.3.6 The climate resilience assessment will draw on industry guidance including Institute of Environment Management and Assessment

[165] UK Met Office Climate Projections for the UK in 2018 (CP18). Available at: UK Climate Projections (UKCP) - Met Office

(IEMA) for Climate Change and Resilience and Adaptation (IEMA, 2020)[166].

M.3.4 PROPOSED APPROACH TO ASSESSMENT

M.3.4.1 The assessment of the impact of climate change on the Proposed Development will include:

- Gaining an understanding of the baseline conditions of the Proposed Development using historical/observational climate data;
- Identifying climate hazards pertinent to the Proposed Development both now and into the future using observational climate data as well as modelled projections;
- Considering the impact future warming scenarios could have on the Proposed Development, using climate model scenario projection data;
- Identification of any 'at risk' assets, i.e. those not resilient to climatic changes; and,
- Suggest adaptation, resilience and/or mitigation measures pertinent to the relevant hazards. This would likely include: a review of existing design measures pertinent to the relevant hazards and at-risk assets, taking a view as to whether the existing controls are sufficient in light of future climate data (through the creation of assessment criteria or use of existing project risk management) and proposing additional measures if necessary.

M.3.4.2 This will be completed in liaison with the Proposed Development's design team and the other environmental disciplines by considering the climate projections for the geographical location and timeframe of the Proposed Development.

M.3.4.3 A statement will be provided within the ES to describe how the Proposed Development will be adapted to improve its resilience to future climate conditions.

M.3.5 LIKELY SIGNIFICANT EFFECTS - EIA

M.3.5.1 The climate resilience assessment will review the resilience of the Proposed Development to changes in the future climate. The weather and climate changes as well as the associated hazards relevant to the Proposed Development may include the following which are outlined in **Table M-1**:

[166] Institute of Environment Management and Assessment (IEMA) for Climate Change and Resilience and Adaptation (IEMA, 2020). Available at: iema-eia-climate-change-resilience-june-2020.pdf

TABLE M-1 - WIDER DETERMINANTS OF CLIMATE CHANGE TO BE SCOPED IN

Categories	Wider determinants of Climate Change	Scoped In	Rationale
Temperature-related climate hazards	Changing temperature; heat stress; temperature variability; heat/ cold waves and frost; and wildfires.	In	Scoped in – temperature-related climate hazards have the potential to impact the Proposed Development's construction, operation and decommissioning.
Water-related climate hazards	Changing precipitation patterns and types (i.e. rain, hail, snow and ice); precipitation or hydrological variability; water stress; drought; heavy precipitation; and floods.	In	Scoped in – precipitation changes, water stress, drought and heavy precipitation and floods are scoped in as there is the potential for these climate hazards to impact the Proposed Development's construction, operation and decommissioning.
	Ocean acidification, saline intrusion, sea level rise and glacial outbursts.	Out	Scoped out – water-related hazards that involve ocean acidification; saline intrusion; sea level rise and glacial outbursts are scoped out as the Proposed Development is not located in an area that is susceptible to these climate hazards.
Wind-related climate hazards	Changing wind patterns, storms.	In	Scoped in – wind-related climate hazards such as changing wind patterns and storms have the potential to impact the Proposed Development's construction, operation and decommissioning.

Categories	Wider determinants of Climate Change	Scoped In	Rationale
	Cyclones, hurricanes, typhoon and tornados.	Out	Scoped out – cyclones, hurricanes, typhoons and tornados are scoped out as the Proposed Development is not located in an area that is susceptible to these climate hazards.
Solid mass-related climate hazards	Coastal erosion, soil degradation, soil erosion, solifluction, avalanche, landslide and subsidence	Out	Scoped out – solid mass-related climate hazards are scoped out as the Proposed Development is not located in an area that is susceptible to these climate hazards.

M.3.5.2 All of these changes to weather and climate have the potential to impact the Proposed Development's construction, operation and decommissioning.

M.3.6 EFFECTS SCOPED OUT OF THE EIA

M.3.6.1 Due to the potential for climate change to impact the construction, operation and decommissioning of the Proposed Development temperature, water and wind climate-related hazards have been scoped in as detailed in **Table M-1**.

M.3.6.2 However, there are some water, wind and solid mass-related climate hazards that have been scoped out as detailed in **Table M-1**.

M.3.7 MITIGATION

M.3.7.1 Once the assessment of the impact of climate change on the Proposed Development has been completed, the PEIR and ES will identify suitable adaptation measures to ensure that the Proposed Development is resilient to climate change.

M.3.8 IN-COMBINATION CLIMATE CHANGE IMPACT ASSESSMENT

M.3.8.1 All environmental topics assessed within the PEIR and ES have the potential to be impacted by climate change.

M.3.8.2 The impact of climate change on these other environmental topics will be reviewed and assessed by the topic experts using qualitative assessment. Mitigation measures will be identified as part of this process.

M.3.8.3 The in-combination climate impacts will be reported in the relevant PEIR and ES chapter.

M.3.9 SUMMARY AND CONCLUSIONS

M.3.9.1 This chapter summarises the approach for assessing the impact of climate change on the Proposed Development as a result of changes in planning legislation since the Consented Development was submitted.

M.3.9.2 The PEIR and ES will therefore assess the impact of climate change on the Proposed Development and understand the suitable adaptation measures required to ensure the Proposed Development is resilient to future climate change.

M.3.9.3 The in-combination climate impacts will be assessed and reported in the relevant PEIR and ES chapter.

REFERENCES

Air Quality Annual Status Report (ASR) In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, LAQM Annual Status Report 2023, Chesire West and Chester Council, 2024

Air Quality Monitoring in the Vicinity of Demolition and Construction Sites Institute of Air Quality Management (IAQM) 118, 2018

Air Quality Standards Regulations S.I. No. 180, 2011 European Union (EU), 2011

Assessment of Dust from Demolition and Construction Sites IAQM 117, 2024

British Geological Survey 'GeoIndex' Online Mapping: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/

British Geological Survey Geology Viewer. Available Online: BGS Geology Viewer - British Geological Survey

British Standards Institution. BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound. s.l. : BSI, 2019. ISBN 978 0 539 02069 4.

British Standards Institution. BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise. s.l. : BSI, 2014. ISBN 978 0 580 77749 3.

British Standards Institution. BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites. Vibration. s.l. : BSI Standards Limited 2014, 2014. ISBN 978 0 580 77750 9.

British Standards Institution. BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. s.l. : BSI, 2014. ISBN 978 0 580 74378 8.

Chapter 7: Geology, Land and Water Quality of the Original ES for the Consented Development.

Chartered Institute for Archaeologists (2014) Standard and Guidance for Commissioning Work or Providing Consultancy Advice on Archaeology and the Historic Environment. Available Online: https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf Accessed: January 2025

Chartered Institute for Archaeologists (Revised 2020). Standard and Guidance for Historic Environment Desk-Based Assessment, Updated 2020. Available Online: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf Accessed: January 2025.

Cheshire East (2018) Cheshire East Landscape Character Assessment. Available Online: https://www.cheshireeast.gov.uk/environment/heritage_natural_environment/landscape/development-effects-on-landscape-and-peoples-experience-of-landscape.aspx

Cheshire East Council. Environmental Protection SPD. s.l. : Cheshire East Council, 2024.

Cheshire East Council. Local Plan Strategy 2010-2030. Crewe : Cheshire East Council, 2017.

Cheshire Replacement Minerals Local Plan, 1999. Available Online: https://www.cheshireeast.gov.uk/pdf/planning/spatial-planning/strategic-planning/en-ldf-crepmlp-99.pdf

Cheshire West & Chester Council. Local Plan (Part One) Strategic Policies. s.l. : Cheshire West & Chester Council, 2015.

Cheshire West & Chester Council. Local Plan (Part Two) Land Allocations and Detailed Policies. s.l. : Cheshire West & Chester Council, 2015.

Cheshire West and Chester Council (2015) Local Plan (Part One) Strategic Policies. Available Online: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-one

Cheshire West and Chester Council (2015). Available at: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-one

Cheshire West and Chester Council (2016) A Landscape Strategy for Cheshire West and Chester Borough. Available Online: https://www.cheshirewestandchester.gov.uk/residents/planning-and-building-control/total-environment/local-landscape-character-assessment-landscape-strategy-2016

Cheshire West and Chester Council (2019) Local Plan (Part Two) Land Allocations and Detailed Policies. Available Online: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-two

Cheshire West and Chester Council (2019). Available at: https://www.cheshirewestandchester.gov.uk/your-council/policies-and-performance/council-plans-policies-and-strategies/planning-policy/local-plan/local-plan-part-two

Cheshire West and Chester Council Minerals Safeguarding Guidance Note (Undated). Available Online: https://cheshirewestandchester.objective.co.uk/portal/dm/guidance_forms/min_safe_gn

Chesire West and Chester Council (2017). Available at: https://consult.cheshirewestandchester.gov.uk/file/4527789

Chesire West and Chester Council (2017). Available at: https://consult.cheshirewestandchester.gov.uk/file/4527789

Control of Pollution Act 1974. Legislation.gov.uk. Available Online https://www.legislation.gov.uk/ukpga/1974/40. Accessed November 26, 2024

Department for Energy Security & Net Zero National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2). Presented to the Houses of Parliament pursuant to section 9(8) of the Planning Act 2008. Accessed February 2025. Available Online: Fossil Fuel Electricity Generating Infrastructure National Policy Statement - EN-2

Department for Energy Security and Net Zero (DESNZ), (2023). National Policy Statement for Natural Gas Supply Infrastructure for Natural Gas Supply Available Online: https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf

Department for Energy Security and Net Zero (DESNZ). 2023. Overarching National Policy Statement for Energy (EN-1). Available Online: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1. Accessed February 2025

Department for Environment, Food & and Rural Affairs. Noise Policy Statement for England (NPSE). London : Crown Copyright 2010, 2010.

Department for Environment, Food and Rural Affairs (DEFRA) 'Magic' Online Mapping: https://magic.defra.gov.uk/magicmap.aspx

Department for Levelling Up, Housing and Communities. 2024. National Planning Policy Framework. Available Online: https://www.gov.uk/government/publications/national-planning-policy-framework-- Accessed: February 2025

Department of Transport Welsh Office HMSO. Calculation of Road Traffic Noise. London : Crown Copyright 1988, 1988. ISBN 0 11 550847 3.

DESNZ (2023). National Policy Statement for Natural Gas Supply Infrastructure for Natural Gas Supply Available at: National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

DESNZ (2023). NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at: EN-4 Overarching National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines.

DESNZ (2023). Overarching NPS for Energy (EN-1). Available at: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK

DESNZ (2023). Overarching NPS for Energy (EN-1). Available at: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK [Accessed April 2025]

EA Reservoirs Map. Available Online: Technical map - Check your long term flood risk - GOV.UK Accessed February 2025.

EA Surface Water Map. Available Online: Surface water map - Check your long term flood risk - GOV.UK Accessed February 2025.

English Heritage (2008) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. Available Online: https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/ Accessed January 2025.

English Indices of Multiple Deprivation. Available Online: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

Environment Agency (EA) Flood Maps. Available Online: Flood risk information for this location - Flood map for planning - GOV.UK

Environment Agency / Department for Environment, Food and Rural Affairs, Land Contamination Risk Management (LCRM), October 2020 (Last Revised July 2023). Available Online: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

Environment Agency 'Catchment Data Explorer'. Available Online: https://environment.data.gov.uk/catchment-planning

Environment Agency 'Water Resources: Help for Licence Trading' Online Mapping: https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=db8e98d0845e461393855f9a3ddba2eb

Environmental Protection Act 1990. Available Online: https://www.legislation.gov.uk/ukpga/1990/43/contents.

European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, 2008/50/EC

European Parliament (2000) Directive 2000/60/EC of the European Parliament and of the Council Establishing a Framework for the Community Action in the Field of Water Policy ("The Water Framework Directive"). Available Online: http://ec.europa.eu/environment/water/water-framework/index_en.html

European Parliament (2007) Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks. Available Online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32007L0060

European Parliament (2017) Conservation of Habitats and Species Regulations 2017. Available Online: https://www.legislation.gov.uk/uksi/2017/1012/contents/made

European Parliament (2017) The Water Supply (Water Quality) Regulations 2016. Available Online: https://www.legislation.gov.uk/uksi/2016/614/contents/made

Google Earth. 2025. Google Earth Maps. Available Online: Google Earth. Accessed April 2025.

Google Earth. 2025. Google Earth Maps. Available Online: Google Earth. Accessed February 2025.

Groundwater (England and Wales) Regulations, 2009. Available Online: https://www.legislation.gov.uk/ukdsi/2009/9780111480816

Guidance on Land-Use Planning and Development Control: Planning for Air Quality v1.2 IAQM, 2017

Guidance on the Assessment of the Air Quality Effects of Development on Designated Nature Conservation Sites Prepared by the Institute of Air Quality Management IAQM 120, 2019

Halton Borough Council (2022). Available at: https://www3.halton.gov.uk/Documents/planning/planning%20policy/newdalp/DALP%20Adopted.pdf

Halton Borough Council (2022). Available Online: https://www3.halton.gov.uk/Documents/planning/planning%20policy/newdalp/DALP%20Adopted.pdf

Highways England. Design Manual for Roads and Bridges, LA 111 Noise and Vibration Revision 2. London : Highways England, 2020.

Historic England (2016) Preserving Archaeological Remains Decision-Taking for Sites under Development. Available Online:

https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/heag100a-preserving-archaeological-remains/ Accessed January 2025.

Historic England (Revised 2017) Historic Environment Good Practice Advice in Planning Note 3

HMSO (2009) The Flood Risk (England and Wales) Regulations 2009. Available Online: https://www.legislation.gov.uk/uksi/2009/3042/pdfs/uksi_20093042_en.pdf

HMSO (2009) The Groundwater (England and Wales) Regulations 2009. Available Online: https://www.legislation.gov.uk/ukdsi/2009/9780111480816/pdfs/ukdsi_9780111480816_en.pdf

HMSO (2015) The Environmental Damage (Prevention and Remediation) (England) Regulations 2015. Available Online: https://www.legislation.gov.uk/uksi/2015/810/pdfs/uksi_20150810_en.pdf

IEMA (2004). Guidelines for Environmental Impact Assessment.

IEMA (2017). Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK EIA Practice. Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia.

Institute of Environmental Management & Assessment (IEMA), (2004). Guidelines for Environmental Impact Assessment.

Institute of Environmental Management & Assessment (IEMA), (2017). Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK EIA Practice. Available Online: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia.

Institute of Environmental Management & Assessment (IEMA), A New Perspective on Land and Soil in Environmental Impact Assessment, (2022). Available Online: https://www.iema.net/resources/blog/2022/02/17/launch-of-new-eia-guidance-on-land-and-soils

Institute of Environmental Management & Assessment (IMEA), (2021). Principles of Cultural Heritage Impact Assessment in the UK Available Online: https://files.clickdimensions.com/iemanet-ay0iq/files/j30361_iema_principlesofchia_v8.pdf?1626095514392 Accessed January 2025.

Institute of Environmental Management and Assessment (IEMA), (2023). Guidelines for the Environmental Assessment of Road Traffic and Movement. Available Online: https://www.thenbs.com/PublicationIndex/documents/details?Pub=IEA&DocID=257892 Accessed February 2025

International Organization for Standardization. ISO 9613-2 Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: Engineering Method for the Prediction of Sound Pressure Levels Outdoors. Geneva : ISO 2024, 2024.

Keuper Gas Storage Project Environmental Statement, November 2015. Prepared by Environmental Resources Management Limited.

Keuper Gas Storage Project Flood Risk Assessment. Document Reference 5.2. October 2015 submitted as part of the Original ES for the Consented Development.

Keuper Gas Storage Project. 2015. Construction Environmental Management Plan. October 2015. Application Reference No. EN030002.

Keuper Gas Storage Project. Construction Environmental Management Plan. October 2015. Application Reference No. EN030002.

Landscape Institute (2015) GLVIA3 – Statements of Clarification. Available Online: https://www.landscapeinstitute.org/technical-resource/glvia3-clarifications/

Landscape Institute (2019) Visual Representation of Development Proposals, Technical Guidance Note 06/19. Available Online: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

Landscape Institute (2021) Technical Guidance Note 02/21: Assessing Landscape Value Outside National Designations. Available Online: https://www.landscapeinstitute.org/publication/tgn-02-21-assessing-landscape-value-outside-national-designations/

Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Routledge, London.

Local Air Quality Management Technical Guidance TG (16) ((Department for Environment Food and Rural Affairs, (Defra) TG (22)) Defra, 2022 The Environment Act 1995 (Part IV)

Mining Remediation Authority Online Map Viewer: https://datamine-cauk.hub.arcgis.com/

Ministry of Housing, Communities & Local Government, National Planning Policy Framework (NPPF), 2012 (Revised 2023). Available Online: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf

Ministry of Housing, Communities and Local Government. Planning Practice Guidance on Noise. GOV.UK. Available Online: https://www.gov.uk/guidance/noise--2. Accessed November 2024.

Ministry of Housing, Communities, and Local Government (2024). Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

National Planning Policy Framework, 2023, Ministry of Housing, Communities and Local Government. Available online at: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf

National Policy Statement for Electricity Networks and Infrastructure (EN-5). s.l. : Open Government Licence v3.0, 2023. ISBN 978-1-5286-4586-7.

National Soil Resources Institute 'Soilscapes' Online Map Viewer: https://www.landis.org.uk/soilscapes/

Natural England (2014) An Approach to Landscape Character Assessment. Available Online:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf

Natural England (2015). Managing Significance in Decision-Taking in the Historic Environment. Available Online: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/

Natural England (2017). The Setting of Heritage Assets. Available Online: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/

Natural England (2025) National Landscape Character Areas. Available Online: https://nationalcharacterareas.co.uk/

Natural England, Agricultural Land Classification Online Mapping: https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::provisional-agricultural-land-classification-alc-england/explore?location=52.702412%2C-2.141583%2C6.98

Nomis Official Census and Labour Market Statistics. Available Online: Nomis - Official Census and Labour Market Statistics

ONS (2016) Workers in the Tourism Sector: Examining their Private Pension Savings, Great Britain, July 2012 to June 2014. Available Online: < Workers in the tourism sector - Office for National Statistics >

OS Open Rivers | Data Products | OS

The Planning Inspectorate (2017). Advice on EIA Notification and Consultation. Available at: Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation - GOV.UK.

The Planning Inspectorate (2017). Advice on EIA Notification and Consultation. Available Online: Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation - GOV.UK.

The Planning Inspectorate (2018). Advice Note Nine: Rochdale Envelope. Available at: Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope - GOV.UK.

The Planning Inspectorate (2018). Advice Note Nine: Rochdale Envelope. Available Online: Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope - GOV.UK.

The Planning Inspectorate (2019). Advice on Cumulative effects assessment relevant to nationally significant infrastructure projects. Available at: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK.

The Planning Inspectorate (2019). Advice on Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects. Available Online: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK.

The Planning Inspectorate (2020). Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements. Available at: Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements - GOV.UK.

The Planning Inspectorate (2020). Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements. Available Online: Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements - GOV.UK.

UK Government (1991) The Land Drainage Act 1991. Available Online: https://www.legislation.gov.uk/ukpga/1991/59/contents

UK Government (1991) Water Resource Act 1991. Available Online: https://www.legislation.gov.uk/ukpga/1991/57/contents

UK Government (2002) Hedgerow Regulations 2002 (As Amended). Available Online:https://www.gov.uk/guidance/countryside-hedgerows-regulation-and-management Accessed: January 2025.

UK Government (2003) Water Act. Available Online: https://www.legislation.gov.uk/ukpga/2003/37/contents

UK Government (2010) Flood and Water Management Act 2010. Available Online: https://www.legislation.gov.uk/ukpga/2010/29/contents

UK Government, (2013). The Bathing Water Regulations 2013. Available Online: https://www.legislation.gov.uk/uksi/2013/1675/contents/made

UK Government, (2014). Water Act 2014. Available Online: https://www.legislation.gov.uk/ukpga/2014/21/contents/enacted

UK Government, (2016). The Environmental Permitting (England and Wales) Regulations 2016. Available Online: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

UK Government, (2018). The Private Water Supplies (England) (Amendment) Regulations 2018. Available Online: https://www.legislation.gov.uk/uksi/2018/707/contents/made

UK Government, (2021). Environment Act 2021. Available Online: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

UK Government, (2023). The Environmental Targets (Water) (England) Regulations 2023 (SI 2023/93). Available Online: https://www.legislation.gov.uk/uksi/2023/93/contents/made

UK Government, Department for Transport. 2025. Manual Count Points. Available Online: https://roadtraffic.dft.gov.uk/manualcountpoints/47279. Accessed February 2025.

UK Government, Department for Transport. 2025. Road Traffic Statistics. Available Online: Traffic Count Data Site. Accessed February 2025.

UK Government,(2024). National Policy Statement for Renewable Energy Infrastructure (EN-3) Available Online: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf Accessed January 2025.

Waste Planning Merseyside (2013). Available at: https://www.wirral.gov.uk/files/joint-waste-local-plan-front.pdf/download?inline

Waste Planning Merseyside (2013). Available Online: https://www.wirral.gov.uk/files/joint-waste-local-plan-front.pdf/download?inline

Water Resources Act 1991. Available Online: https://www.legislation.gov.uk/ukpga/1991/57/contents.

West Cheshire SFRA. June 2008. West Cheshire SFRA Summary Report.pdf Accessed February 2025.

ERM HAS OVER 140 OFFICES ACROSS THE FOLLOWING COUNTRIES AND TERRITORIES WORLDWIDE

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
Denmark
France
Germany
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
Netherlands
New Zealand
Panama
Peru
Poland
Portugal
Romania
Singapore
South Africa
South Korea
Spain
Switzerland
Taiwan
Thailand
UAE
UK
US
Vietnam

ERM's London Office
2nd Floor, Exchequer Court
33 St Mary Axe
London
EC3A 8AA

T: +44 (0) 20 3206 5200
F: +44 (0) 20 3206 5440

www.erm.com