Connah's Quay Low Carbon Power

Preliminary Environmental Information Report
Volume IV, Appendix 13-A: Water Environment Baseline Survey and Methodology Report

Uniper

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Prepared for:
Uniper UK Limited

Prepared by:
AECOM Limited

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1. Water Baseline and Methodology

1.1 Introduction

1.1.1 This appendix supports **Preliminary Environmental Information Report (PEIR) Volume II Chapter 13: Water Environment and Flood Risk** and provides a detailed description of the study area baseline including the identification of receptors and their individual importance (value).

1.1.2 This appendix also defines the methodology that is used to assess the potential impacts associated with the Proposed Development and the determination of the significance of effects. This baseline also supports the Water Framework Directive Screening and Scoping Assessment presented in **Appendix 13-B**.

1.2 Existing Baseline

Existing site

1.2.1 The Site is located north-west of Connah's Quay in Flintshire, north-east Wales. The Proposed Development Site Boundary is shown on **Figure 3-1: Indicative DCO Site** (**PEIR Volume III**). The current four-unit CCGT and associated infrastructure (including GTP) was constructed between 1993 and 1996 in the south-east of the Main Site. The plant was constructed on the Pulverised Fuel Ash (PFA) settlement lagoons of the former coal-fire station site, which raised the Site to its current height (maximum 7 m AOD). The C&IEA formed part of the laydown area for the construction of the current power station.

1.2.2 The Main Site is relatively flat with an average elevation of 7.3 m Above Ordnance Datum (AOD) and is approximately 56.5 ha. The Main Site is bordered to the north-east and north-west by the Dee Estuary, to the east and south-east by the existing National Grid 400 kV Deeside Substation, and south and south-west by North Wales Main Railway line.

1.2.3 The existing Connah's Quay Power Station is a four-unit combined CCGT plant providing dispatchable power export to the National Grid. The existing gas fired (CCGT) generating station also includes supporting infrastructure, including settlement ponds, cooling towers, and a water treatment plant, in addition to buildings for storage and workshops, internal access road and parking. Cooling water abstraction and discharge points for the existing Connah's Quay Power Station are located adjacent to the River Dee estuary, within the Water Connection Corridor, adjacent to the Main Site.

1.2.4 The current power station relies on a recirculating hybrid tower system for process cooling. This system draws water from the nearby River Dee as makeup water. Additionally, the cooling system discharges purge water from the cooling system back into the Dee River following treatment on Site and in accordance with an Environmental Permit from Natural Resources Wales

(NRW). To minimise any impact on the River Dee estuary, the abstraction and discharge of cooling water occurs only during specific periods around high tide where there is the greatest supply, dilution and dispersion potential.

Current Abstraction and Discharge Restrictions

1.2.5 The current abstraction licence limits the abstraction of cooling water from the River Dee estuary, and the current permit allows discharge of cooling water to the River Dee estuary, as well as the discharge of surface water to Kelsterton Brook / Old Rockcliffe Drain. The currents limits are listed below:

- **abstraction limitation:** includes a maximum of three hours per tide around high water, one hour before and two hours after high water. Make-up and purge water are stored in ponds with capacities of 31,000 m^3 and 20,000 m^3, respectively. The purge ponds included a cooling tower for additional cooling before discharge. Water abstraction limits include a maximum instantaneous abstraction of 3.04 m^3/s, hourly abstraction of 11 megalitres per hour (ML/h) per high tide abstraction of 33 ML, and annual abstraction of 24,090 ML; and
- **discharge limitation:** purge discharge is limited to no more than three hours, starting one hour after high water during the ebb tide.

Study Area

1.2.6 The study area represents a Zone of Influence (ZOI) that has been defined to include water environment features likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development, as well as to consider existing flood risk. The potential ZOI is 1 km from the Site boundary, excluding the Abnormal Indivisible Load routes and ports.

1.2.7 Since watercourses flow and impacts may propagate downstream, where relevant, the study area should also consider a wider ZOI based on professional judgement. However, in this case due to the proximity of the Site to the River Dee estuary, and the size of this water feature, it is considered the ultimate downstream receptor for this assessment.

1.2.8 During the scoping assessment as described in Chapter 11: Water Environment and Flood Risk of Appendix 1-A: Scoping Report, a 2 km ZOI was initially considered. However, it has since been found that there are no hydrological connections to water features between 1 km and 2 km distance, therefore a reduced ZOI has been considered only. However, as noted above, downstream water features and their attributes have been considered within the assessment.

1.2.9 As flood risk impact can also impact upstream and downstream, the Flood Consequences Assessment (FCA) considers a wider study area, where relevant. Professional judgement has been applied to identify the extent to which such features are considered. Additional indirect effects may also occur to other water environment receptors distant from the study area through increased demand on potable water supplies and foul water treatment.

Data sources

1.2.10 The data sources for the assessment are based on a desk-based study and a Site walkover survey, which are described in the following sections.

Desk based study

1.2.11 The desk-based study has been undertaken to identify the surface water and groundwater features within and adjacent to the Proposed Development, and to gather and critically evaluate relevant data and information on their condition and attributes. The baseline information for this chapter has been derived from:

- Ordnance Survey (OS) Mapping (Ref 3 and Ref 4);
- Met Office climate averages (Ref 2);
- Water Watch Wales WFD Mapping (Ref 1);
- The Department for Environment, Food and Rural Affairs (Defra) Multi-agency geographical information for the countryside website (MAGIC) map (Ref 5);
- National Rivers Flow Archive website (Ref 6);
- NRW River, rainfall and sea levels website (Ref 7);
- British Geological Survey (BGS) online Borehole and Geology Mapping (Ref 9 and Ref 10);
- Soil site investigation reports (Ref 6);
- NRW Development Advice Map (Ref 13);
- NRW Flood Map for Planning (Ref 12);
- NRW Flood and Coastal Erosion Risk Maps (Ref 15);
- Flintshire Local Flood Risk Management Strategy 2013 (Ref 16);
- Flintshire Strategic Flood Consequence Assessment 2018 (Ref 17);
- North West England and North Wales Shoreline Management Plan SMP2 (Ref 18);
- Dee Estuary: North West Estuaries Processes Reports (Ref 19);
- Tidal Dee Catchment Action Plan (Ref 20);
- River Dee Basin Management Plan (Ref 22);
- The Deeside Plan 2017 (Ref 21)
- NRW Licenced Water Abstractions website (Ref 24);
- Permitted Discharges to Controlled Waters with Conditions (Ref 25);
- NRW Environmental Pollution Incidents website (Ref 26); and
- NRW Water Quality Archive website (Ref 41).

Site walkover survey

1.2.12 A site walkover survey was undertaken by a geomorphologist and a water scientist on 26th March 2024. This site walkover was to observe the surface watercourses identified as potential receptors, and record connectivity, water quality observations, and hydromorphology.

1.2.13 Weather conditions were dry at the time of survey, but with rainfall preceding. The site visit occurred over one day, and survey locations were determined based on likely areas of impact and availability of access.

Topography and Land-use

1.2.14 The Proposed Development is predominantly located immediately south-east of the Dee Water Framework Directive (WFD) Transitional Water Body. The Main Site is therefore indicative of its flat, low-lying coastal topography with typical ground levels ranging between approximately 6-8 m Above Ordnance Datum (AOD).

1.2.15 The Main Site, Electrical Connection Corridor and C&IEA are characterised by flat, low-lying coastal topography with typical ground levels of approximately 6 m to 8 m AOD. The Water Connection Corridor is similar to the aforementioned sites, with the northern portion extending out into the lower marshland and channel of the River Dee estuary to the north (approximately 3 m to 4 m AOD).

1.2.16 The Main Site, Electrical Connection Corridor, C&IEA and Water Connection Corridor are bounded to the south-west by the North Wales Main Line railway and to the north-east by the River Dee and associated floodplain/marshland. The A548 passes over the River Dee between The Main Site/Water Connection Corridor and C&IEA .

1.2.17 The Repurposed CO2 Connection Corridor extends from the Main Site rising upslope towards the Proposed CO2 Connection Corridor (ground levels ranging from approximately 36 m AOD to 48 m AOD).

1.2.18 The land use in the south-east of the Main Site is predominantly industrial, containing the existing Connah's Quay Power Station, with arable/grasslands surrounding the Site to the west, and the River Dee estuary to the north. The C&IEA is constrained by the River Dee estuary to the north and east, with the remainder surrounded by built-up land, with the power station to the north-west and the residential areas of Kelsterton and Golftyn to the south-west.

Rainfall

1.2.19 The nearest weather station on the Met Office website (Ref 2) with historical data is located at Hawarden (Flintshire), approximately 6.9 km west southeast of Connah's Quay eastern extent of the Main Site. Based on the average climate data (for the period 1981 to 2010 (as the most recent data available)) for this weather station, it is estimated that the study area experiences an average of approximately 1465 mm of rainfall per year with it raining more than 1 mm on approximately 137 days per year. This demonstrates that the area can be categorised as dry in comparison to most of the United Kingdom. Rainfall at this location in winter and spring is generally peaking in December

(around 136 mm), with the least rainfall in April (approximately 76 mm) on average.

1.2.20 **Plate 1** illustrates how the average rainfall varies throughout the year, with the wettest period being in early autumn to winter, and driest in later winter to spring. Average rainfall is generally less than 60 mm throughout the year, expect in September to November when it is between 62 and 75 mm, March is the driest with an average rainfall of approximately 48 mm rainfall between 1991 and 2020.

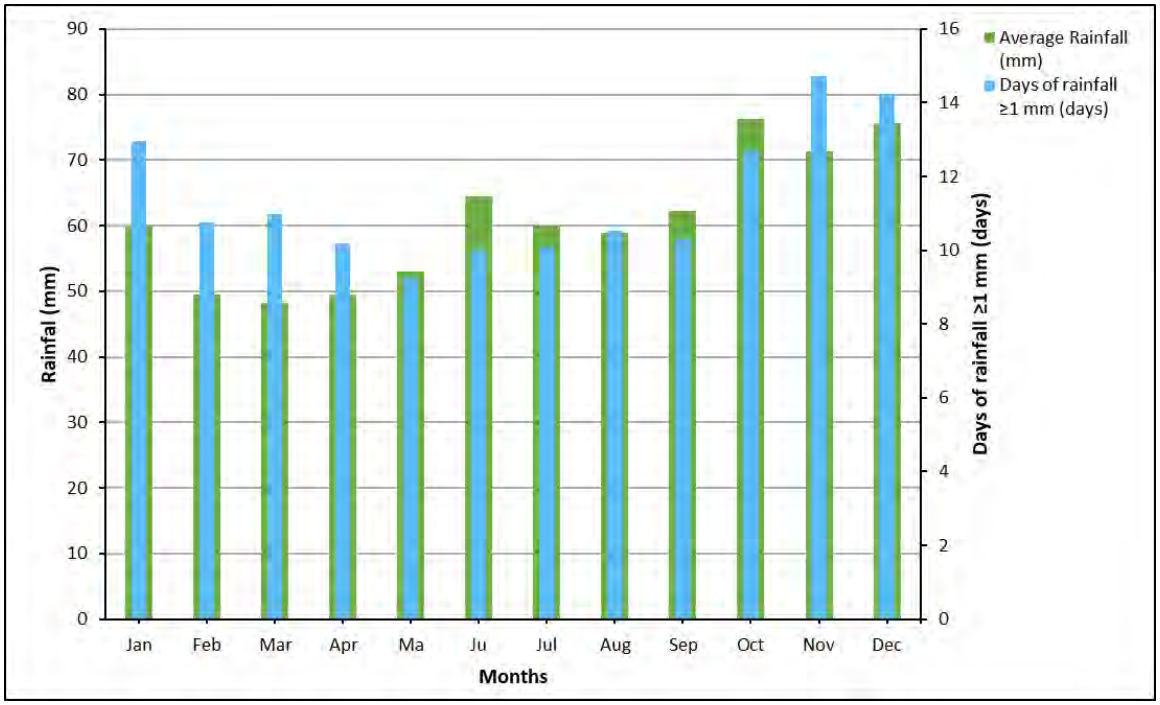

Plate 1: Hawarden (Flintshire) Weather Station – Average rainfall per month (1991-2020) and average days per month with >1 mm of rainfall (1991-2020)

Surface Water Features

1.2.21 Surface watercourses within the study area have been identified from data from OS mapping and the NRW Water Watch Wales Map Gallery website (Ref 1) and observations from the site walkover. A list of the surface waterbodies identified within the Site Boundary are detailed within **Table 1** and also shown on **Figure 13-1: Surface Water Features** (**PEIR Volume III).**

Table 1: Surface Water Features within the Study Area

Waterbody	Waterbody Type	Description Summary	Scoped In/out
River Dee (WFD)	Transitional / Main River	The River Dee is a designated Main River and flows south-east to north-west along the boundary of the Main Site.	In
Kelsterton Brook	Watercourse (Ordinary)	The Kelsterton Brook is an ordinary	In

Waterbody	Waterbody Type	Description Summary	Scoped In/out
		watercourse that flows in a northly direction towards the main site before being culverted beneath the Site.	
Old Rockcliffe Drain	Watercourse (Ordinary	The Old Rockcliffe Drain is a tributary of the Kelsteron Brook. The watercourse flows in a northerly direction to Chester Road, where it enters a culvert.	In
Lead Brook / Northop Brook	Watercourse (Ordinary)	The Lead Brook is an ordinary watercourse that flows south to north through the study area and is a tributary of the Dee estuary.	In
Pentre Brook and tributaries	Watercourse (Ordinary)	Pentre Brook is an ordinary watercourse and is a tributary of the Dee estuary. Pentre Brook is also known as Pandy Brook by NRW.	In
Wepre Brook	Watercourse (WFD)	Wepre Brook is a WFD water body that flows in a generally north-easterly direction. The water body enters the River Dee approximately 1.5 km south-east and upstream of the Site Boundary.	Out - The Proposed Development does not encroach on the Wepre Brook and Swinchiard Brook catchments and have been identified as having no hydrological connectivity and therefore have been scoped out of the assessment.
Swinchiard Brook	Watercourse (WFD)	Swinchiard Brook is a WFD waterbody that flows through the western edge of the Study Area. The water body is approximately 1.7 km west and	

Waterbody	Waterbody Type	Description Summary	Scoped In/out
		upstream of the Site Boundary.	
Allt-Goch and tributaries	Watercourse (Ordinary)	The Allt-Goch drains a small catchment to the south of the Main Site that drains a small catchment between Lead Brook and Pentre Brook.	In
Oakenholt Brook	Watercourse (Ordinary)	Oakenholt Brook is a small unnamed watercourse between Lead Brook and Old Rockcliffe Drain.	In
Unmapped/Unnamed Streams (South of the Main Site)	Watercourse (Ordinary)	Various small watercourses that may all potentially be impacted by the Proposed Development by either being crossed by the Repurposed CO_2 Connection Corridor, crossing the Main Site, or being downstream of the Proposed Development.	In

1.2.22 Further descriptions of each of the watercourses are provided in the sections below. There is potential that unmapped watercourses, such as field drains, are located within the study area, these are not described within the baseline however will be accounted for within the assessment.

WFD Water Bodies

1.2.23 The NRW Water Watch Wales Map Gallery website (Ref 1) confirms that the Site Boundary is contained within the Dee Estuary WFD Operational Catchment, within the Dee Management Catchment.

1.2.24 In total, the Site Boundary includes two WFD water bodies, including one transitional WFD water body and one groundwater body, these are highlighted within **Table 2** (see also **Figure 13-1: Surface Water Features** (**PEIR Volume III**)). There is a large area of the study area which does not fall within a WFD water body catchment, but as the ultimate receptor of all watercourses within the study area is the Dee Transitional Water Body.

Table 2: WFD Water Bodies in the Site Boundary and current status (Cycle 3 2021) (Ref 34)

Water body name	Waterbody ID	Waterbody type	Hydro-morphological Designation	Catchment / groundwater Area (km^2)	Current status / Potential		Chemical Failing Elements	Reasons for not achieving good status	Overall Objectives
Dee (N. Wales)	**GB53110 6708200**	Transitional	Heavily modified	305.8	Overall status	Moderate	Specific pollutants, phosphate	Point source pollution from continuous sewage discharge by the water industry	Good by 2027
					Chemical	Moderate			
					Ecological	Good			
Dee Carboniferous Coal Measures	**GB4110 2G204800**	Groundwater	Natural	1184	Overall	Poor	Chemicals – not specific	Diffuse source pollution from abandoned mine	Poor by 2015
					Ecological	Good			
					Chemical	Poor			

River Dee and Dee Estuary

1.2.25 The River Dee is a designated Main River which drains a catchment area of approximately 1,800 km2, mainly in Wales but in the lower reaches the Dee often runs along the border of England. Its source is in the mountains and lakes of the Snowdonia National Park before it runs to the Dee Estuary. Reservoirs in the upper parts of the catchment store water and regulate the flow in the Dee. There is a continuous area of low-lying marshland and tidal mudflats between the Proposed Development and the main channel. The River Dee and its estuary has a high conservation value being designated as two Special Areas of Conservation (SAC), and notified as three separate Sites of Special Scientific Interest (SSSIs). The intertidal habitat of the Dee Estuary is designated as a Special Protection Area (SPA) and Ramsar site.

1.2.26 The Shoreline Management Plan (SMP) (Ref 18) describes the mouth of the Dee estuary as being characterised by several channels and sandbanks. It states that much of the Welsh bank of the estuary has industrial and commercial activities at the shoreline, including factories and power stations, as well as the railway line and roads. The extensive inter-tidal flats, and the waterfowl that use them, are protected with numerous environmental conservation designations. The long-term plan under the SMP is to continue to manage risks to commercial and industrial assets from flooding and erosion, but to also allow more natural evolution where appropriate. In order to mitigate the impacts of the defences on the evolution of the estuary in combination with expected long term future sea level rise the plan allows for creation of areas of new habitat by moving defences inland where opportunities exist. Managed realignment was therefore assessed as an alternative policy at a number of locations within the Dee.

1.2.27 The existing Connah's Quay Power Station sits on an area of reclaimed land which was previously an expanse of clay-silt-sand-based alluvium deposits. Expansive sandbars were prominent at the Site between 1885-1900, with a single-thread meandering channel, before entering the Irish Sea.

1.2.28 Today, the estuary has had industrial properties built along the south-western edge, including flood defenses, which alongside climate change has the potential for further loss of salt-marsh due to processes associated with coastal squeeze. The main channel of the River Dee which flows in from the east-side of the estuary, is also heavily modified, exhibiting a canalised and regular planform upstream of Connah's Quay which it has been since as far back as at least the 1860's.

1.2.29 Superficial deposits of the transitional water body mainly consist of alluvium deposits, which stretch across much of the current urban area on the right-bank where the A548 passes over, highlighting that the transitional body was once a lot wider than is currently observed today. Further inland, glaciofluvial sands and gravel and Devensian till further where loam to clayey loam is observed as the predominant parent material.

1.2.30 The estuary is macro-tidal where a mean spring tidal range at Hilbre Island at the far west of the estuary is recorded at 7.6 m and is restricted to 3.4 m by Connah's Quay due to the entering river flow. Flood tidal currents are stronger than ebbing tides which promotes the accretion of sediments within the

estuary (Ref 19). The estuary is considered to be a major sink for both mud and sand, with the key source of sediment the onshore movement of sediment from the Irish Sea.

1.2.31 Further information on the Dee Estuary and coastal processes is provided in **Chapter 16: Physical Processes (PEIR Volume II)**.

Water quality

1.2.32 Water quality is monitored by NRW for the estuarine River Dee, as shown on Water Watch Wales (Ref 1).

1.2.33 **Table 3** provides an overview of water quality sample locations for the River Dee.

Table 3: Overview of water quality sample locations for the River Dee

Monitoring Station	NGR	Duration	Number of samples
Powergen Buoyage Point	SJ2840071200	2014-2024	50
Johnson Hole	SJ2923370304	2014-2024	13
White Sands	SJ2612473753	2014-2015	5
The Grindes	SJ2906470442	2014-2015	4

1.2.34 **Table 4** presents a summary of monitoring data for the River Dee.

Table 4: Results of water quality sampling undertaken by NRW for the River Dee (2014-2024)

Parameter Name	Units	EQS	Powergen Buoyage Point			Johnsons Hole			White Sands			The Grindes		
			Min	Max	Mean[1]	Min	Max	Mean[1]	Min	Max	Mean[1]	Min	Max	Mean[1]
Temperature of water	°C	-	4.07	21.10	10.84	4.36	17.67	11.69	11.50	17.60	14.72	12.60	17.20	14.88
Salinity (In Situ)	µg/l	-	1.73	30.92	19.42	7.70	30.92	19.34	11.45	25.71	19.19	0.66	24.49	17.09
Dissolved Oxygen %	%	-	78.7	113.1	91.4	83.7	123	93.0	87.0	114.2	95.6	88.9	116.1	88.9
Dissolved Organic Carbon as C	mg/l	-	1.32	5.71	2.74	2.12	8.87	4.51	-	-	-	-	-	-
Lead (dissolved)	µg/l	1.3	0.052	0.439	0.128	<0.4	<0.4	<0.4	-	-	-	-	-	-
Mercury (dissolved)	µg/l	0.07	<0.01	0.013	0.0108	<0.01	0.027	0.0128	-	-	-	-	-	-
Cadmium (dissolved)	µg/l	0.2	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	-	-	-	-
Zinc (dissolved)	µg/l	6.8	3.17	20.5	6.80	2.9	6.9	5.34	-	-	-	-	-	-
Nickel (dissolved)	µg/l	0.3 / 2	0.591	1.32	0.861	<0.2	<0.2	<0.20	-	-	-	-	-	-
Arsenic (dissolved)	µg/l	25	<2	2.93	2.13	<2	<2	<2	-	-	-	-	-	-
Copper (dissolved)	µg/l	3.76[2]	0.731	1.75	1.117	<3	<3	<3	-	-	-	-	-	-
Chromium Hexavalent (dissolved) Cr VI	µg/l	0.6	<0.3	<0.3	<0.3	-	-	-	-	-	-	-	-	-

Notes

1- Average concentrations have conservatively calculate that values below level of detection are at the level of detection

2 – EQS is for DOC less than 1 mg/l, EQS will be variable and higher for this waterbody given the elevated DOC

3 – Zinc average annual concentration will be variable and higher than EQS for this waterbody accounting for ambient background concentrations.

1.2.35 This data indicates that many of the parameters are below the detectable limit against the WFD Environmental Quality Standards (EQS) (Ref 40) for transitional waters, although there is some evidence of dissolved metal concentrations across the monitoring sites, including exceedances of the EQS at Powerge Buoyage Point for Zinc and Nickel. Zinc average annual concentrations at Powergen Buoyage Point are at around the EQS, however will be higher than the EQS taking into account the ambient background concentration. Nickel concentrations at Powergen Buoyage Point exceed the average annual EQS, however do not exceed the maximum allowable EQS.

Flow

1.2.36 There are no gauging stations within the Proposed Development study area to provide baseline data on flow. However, three stations are located south-east of the proposed development, approximately 16 km to 17 km. These include the Dee at Chester Suspension Bridge (Station NG: SJ410659) the Dee at Iron Bridge (Station NGR: SJ4180060020) and further upstream, the Dee at Farndon (Station NGR: SJ4121154347).

1.2.37 The nearest gauging station on the National River Flow Archive (NRFA) (Ref 6) to the Proposed Development is Dee at Chester Suspension Bridge (gauging station reference 067033) which lies in the town of Chester. The average annual mean flow at this station is 34.078 m3/s. The flow that is exceeded 5% of the time (Q5) is 119 m3/s and the flow that exceeded 95% of the time (Q95) is 5.13 m3/s for gauged mean daily flow for 1994 – 2013. NFRA indicates that this station became inoperative in 2013 due to issues with the ultrasonic gauge, and it has not been reinstated since.

1.2.38 The next nearest upstream gauging station on the National River Flow Archive is Dee at Ironbridge (gauging station reference 067027) which lies downstream of the village of Aldford. The average annual mean flow at this station is 37.785 m^3/s. The flow that exceeded 5% of the time (Q_5) is 123 m^3/s and the flow that exceeded 95% of the time (Q_{95}) is 9.686 m^3/s for gauged mean daily flow for 1994 – 2022. NFRA states that flows are slightly higher here than at Chester Suspension Bridge due to abstractions on the reach.

Summary of Ecological Value

1.2.39 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Kelsterton Brook

1.2.40 Kelsterton Brook is an ordinary watercourse and is a tributary of the Dee Estuary.

1.2.41 The watercourse arises south of the study area at Mole Road and flows in a northerly direction towards the Main Site. The brook is culverted immediately upstream of Kelsterton Lane and the A548, prior to appearing to flow in an easterly direction to the south of the railway line. It is joined by flows from a number of unnamed tributaries, before being culverted beneath the Main Site and eventually discharging to the Dee Estuary.

Water quality

1.2.42 NRW have confirmed that they have no water quality data available for Kelsteron Brook.

Flow

1.2.43 There are no NRW flow gauging stations for Kelsterton Brook, and NRW have stated that they have no spot flow data on the Kelsterton Brook.

Hydromorphology

1.2.44 The Kelsteron Brook was surveyed on the site walkover (26 March 2024). At approximately 1 km upstream of the Site Boundary (NGR SJ 27545 70182) the watercourse was characterised by a sinuous single thread, gravel bed channel which displayed a pool-riffle typology (**Plate 2**). It flowed through an area of woodland surrounded by agricultural fields, and woody material provided by the adjacent woodland helped promote morphological diversity within the channel. Pools, bars and riffles, and areas of natural bank erosion were all noted through this reach. Small pools or scrapes were noted through the left floodplain within the woodland, fed by small drainage channels. Some of these channels had evidence of iron ochre deposits and appeared to be of groundwater origin. An area of channel widening and excessive bank retreat was noted where livestock poaching was evident, which likely contributes fine sediment to the watercourse. A short historic culverted section was also observed in this reach.

Plate 2: Kelsterton Brook flowing through woodland habitat 1 km upstream of Proposed Development boundary

1.2.45 Immediately upstream of the Proposed Development boundary (NGR SJ 27586 70982) the watercourse emerges from a culvert under the A548 (**Plate 3**). Mapping indicates that Kelsterton Brook and Old Rockcliffe Drain join around this location, although the confluence could not be observed on site.

The watercourse comprised an open channel for approximately 25 m at this location, set between the A458 road culvert at the upstream extent and the railway and power station culvert and the downstream extent. A small bridge crossing was also present through this short reach. The channel was straight with a uniform cross section and had little morphological diversity. The banks and riparian zone were vegetated with scrub, grasses and trees. Bed material could not be observed due to access restrictions.

Plate 3: Kelsterton Brook and wider landscape immediately upstream of Proposed Development boundary

1.2.46 Downstream of the existing power station (NGR SJ 27883 71263), Kelsterton Brook and Old Rockcliffe Drain emerges from an approximately 1 m diameter culvert with a tidal flood gate. Concrete wingwalls extend for approximately 4 m downstream of the culvert (**Plate 4**). The watercourse represents a tidal creek through salt marsh from this location to its confluence with the Dee Estuary (**Plate 5**). It is surrounded by tidal marsh which is likely to be periodically inundated during particularly high tides. The channel appeared to have been historically straightened, and likely has a more fixed planform due to historic landscape modifications. Bed sediment comprised mud, clay and silt, representative of sediments typically found within a tidal channel.

Plate 4: Outfall from culvert on Kelsterton Brook

Plate 5: Tidal creek character of Kelsterton Brook and surrounding tidal marsh

Summary of Ecological Value

1.2.47 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Old Rockcliffe Drain

1.2.48 Old Rockcliffe Drain is an ordinary watercourse and arises approximately 1.6 km south of the Main Site. The watercourse is unnamed on OS mapping, however anecdotal information from the existing power station indicates that it is named Old Rockcliffe Drain, therefore this name has been used within the assessment. The watercourse flows in a northerly direction to Chester Road, where it enters a culvert. North of the road there is a confluence with Kelsterton Brook and a small tributary, following which the three are culverted beneath the existing power station site as described above for Kelsterton Brook.

Water quality

1.2.49 NRW have stated they have no water quality data available for Old Rockcliffe Drain.

Flow

1.2.50 There are no NRW flow gauging stations and NRW have stated they have no spot flow data on the Old Rockcliffe Drain.

Hydromorphology

1.2.51 The Old Rockcliffe Drain was surveyed on the site walkover (26 March 2024). The watercourse was observed at NGR SJ 27277 70529 where it comprised a straight modified channel that flowed along a field boundary (**Plate 6**). The channel was uniform and displayed little morphological diversity, having been historically modified for agricultural drainage and likely impacted by livestock poaching and siltation. The bed largely comprised finer material, although some small gravels were noted in parts. The watercourse was culverted under a field access.

Plate 6: Old Rockcliffe Drain flowing adjacent to field boundary approximately 500 m upstream of the Proposed Development boundary

Summary of Ecological Value

1.2.52 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Pentre Brook

1.2.53 Pentre Brook is an ordinary watercourse and is a tributary of the Dee Estuary. Pentre Brook is also known as Pandy Brook by NRW.

1.2.54 The watercourse arises in Flint Mountain and flows in a generally north-easterly direction. The brook flows approximately 480 m west of the Proposed CO_2 Connection Corridor, through Pentre Ffwrndan, prior to discharging to the River Dee estuary.

1.2.55 Tributaries of Pentre Brook (Allt-Goch Brook and an unnamed tributary) are crossed by the Repurposed CO_2 Connection Corridor and the Proposed CO_2 Connection Corridor.

Water quality

1.2.56 NRW have stated that they have no background water quality data available for Pentre Brook, other than records of Water Treatment work discharges to the watercourse.

Flow

1.2.57 There are no NRW flow gauging stations and NRW have stated that they have no spot flow data on the Pentre Brook.

Hydromorphology

1.2.58 Pentre Brook was surveyed on the site walkover (26 March 2024). The watercourse was observed at NGR SJ 25403 72025, where it occupied a gravel and cobble bed channel flowing through a small woodland through the upper length. Further downstream, however, it was confined to a brick banked modified channel taking flow to a mill pond. The channel appeared to have been diverted through an area of higher ground, reducing the gradient and energy of the watercourse. A weir of approximately 4 m height was present at the downstream extent of the mill pond, impounding flow to create the pond (**Plate 7**). The watercourse is culverted under the A548 approximately 0.13 km downstream of the mill pond. Downstream of the A548 crossing the watercourse flows through a straightened channel confined on both banks by buildings and a car park, although there is a minor buffer of some trees and scrub on the right bank. Aerial imagery and mapping indicate that the watercourse is culverted under the railway further downstream, before becoming a tidal creek and discharging to the River Dee.

Plate 7: Weir on Pentre Brook

Summary of Ecological Value

1.2.59 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Lead Brook

1.2.60 The Lead Brook is an ordinary watercourse that flows south to north through the study area and is a tributary of the Dee Estuary.

1.2.61 The brook arises as Northop Brook to the south of Northop and flows in a northerly direction to become Lead Brook. Upstream of Oakenholt, the watercourse is impounded to form a small reservoir, called Oakenholt Reservoir which supplies water for commercial purposes (see **Table 9**) as well as angling. Downstream of the reservoir, the watercourse is culverted beneath Oakenholt Mills and the railway line before discharging to a wide-open channel that extends along the full length of the western boundary of the Main Site, before eventually discharging to the River Dee through a tidal reach. The Repurposed CO_2 Connection Corridor intersects the Lead Brook in the culverted section (NGR SJ 26271 71670) adjacent to the Main Site boundary upstream of the A548 culvert.

Water quality

1.2.62 NRW have a water quality monitoring site on the Lead Brook at "STREAM FROM OAKENHOLT, BY BIRD WATCH" (NGR SJ 2663072000). Sampling there was undertaken 48 occasions between 2018 and 2024. A summary of the data is provided in **Table 5.**

Table 5: Results of water quality sampling undertaken by NRW for Lead Brook "STREAM FROM OAKENHOLT, BY BIRD WATCH" (2018 – 2024)

Parameter Name	Units	EQS	Min	Max	Mean[1]
Temperature of Water	°C	-	4.29	21.3	10.8
Dissolved oxygen	%	-	77.9	115.2	92.3
Salinity (In Situ)	µg/l	-	4.72	31.59	22.20
Dissolved Organic Carbon as C	mg/l	-	1.2	9.67	3.38
Lead (dissolved)	µg/l	1.3	0.0486	1.2	0.2589
Mercury (dissolved)	µg/l	0.07	<0.010	0.010	0.010
Cadmium, Dissolved	µg/l	0.2	<0.03	0.0315	0.03
Zinc, Dissolved	µg/l	6.8	2.7	15.6	6.7
Nickel, Dissolved	µg/l	8.6	<0.2	2.7	0.83
Arsenic, Dissolved	µg/l	25	<2	2.68	2.02
Copper, Dissolved	µg/l	3.76[2]	0.621	2.58	1.32
Chromium Hexavalent (dissolved) (Cr VI)	µg/l	0.6	<0.3	<0.3	<0.3

Notes

1- Average concentrations have conservatively calculate that values below level of detection are at the level of detection

2 – EQS is for DOC less than 1 mg/l, EQS will be variable and higher for this waterbody given the elevated DOC

3 – EQS for Zinc is 6.8 µg/l, EQS will be variable and higher for this waterbody given its location to industrial and urban areas.

1.2.63 The data in **Table 5** indicates that Lead Brook is well-oxygenated water body with detectable concentrations of dissolved metals against the WFD Environmental Quality Stands (EQS). There are no exceedances of average annual EQS, however Zinc is very close to the average annual EQS, with some maximum values above the AA EQS. This is expected given the location of the Lead Brook downstream of industrial and urban areas.

Flow

1.2.64 Lead Brook drains a catchment of 3.05 km^2. There are no NRW flow gauging stations or spot flow data on the Lead Brook.

Hydromorphology

1.2.65 Lead Brook was surveyed on the site walkover (26 March 2024). The watercourse was observed at NGR SJ 26316 71180, where it is impounded by an earth dam creating a reservoir upstream that was being used for recreational coarse fishing. A spillway with vertical brick banks took flow down the approximately 15 m high slope to the natural channel level (**Plate 8**). It is likely that coarse sediment transport within the watercourse is severely hindered by the dam, preventing coarse sediment from being transported from reaches upstream of it. The watercourse flowed through a woodland for

approximately 250 m downstream of the dam, where mapping then indicates it is culverted under a paper mill, the A548 road and the railway.

Plate 8: View to Lead Brook at bottom of spillway from reservoir

1.2.66 Lead Brook was also observed downstream of Chester Road (NGR SJ 26326 71752), where it emerges from a culvert with tidal flood gate into an approximately 5 m wide artificial basin. This basin had a silty bed with barely perceptible flow. A straight channel, likely artificially straightened, flowed from the basin (**Plate 9**) towards the Dee Estuary. This channel had some gravel noted on the bed, especially where the gradient was steeper, although bed substrate was predominantly comprised of silt and clay, characteristic of a tidal creek. The creek is quite incised in places and low tide levels may be around 1 m below bank top. The riparian zone comprised short grasses and halophytes typical of a coastal lowland location. The creek was observed close to high tide.

Plate 9: Straight section of Lead Brook to the west of the Proposed Development boundary

Summary of Ecological Value

1.2.67 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Oakenholt Brook

1.2.68 An unnamed watercourse arises approximately 1.6 km south-east of the Main Site, between Lead Brook and Old Rockcliffe Drain. The watercourse flows in a northerly direction beneath Oakenholt Lane and is then culverted beneath Chester Road and the railway line. The direction of the watercourse after the railway line is not known. The watercourse has been named Oakenholt Brook for the purposes of this assessment.

Water quality

1.2.69 There are no NRW water quality data available from for Oakenholt Brook.

Flow

1.2.70 There are no NRW flow gauging stations or spot flow data on the Oakenholt Brook.

Hydromorphology

1.2.71 Oakenholt Brook was surveyed on the site walkover (26 March 2024). The watercourse was observed at the crossing of Oakenholt Lane (NGR SJ 26406 70775), approximately 0.85 km upstream of the Site boundary (**Plate 10**). The watercourse at this location comprised a gravel bed channel set within agricultural fields. The watercourse was incised and likely has limited floodplain connection through this length. A narrow strip of trees and scrub occupy the riparian zone, with agricultural fields and Oakenholt Lane surrounding.

Plate 10: Incised reach of Oakenholt Brook upstream of Oakenholt Lane

1.2.72 The watercourse was also observed immediately upstream and downstream of the A458 road culvert (NGR SJ 26880 71288). It occupied a straight, modified incised channel both upstream and downstream of the road crossing. The riparian zone comprised a narrow strip of trees and scrub surrounded by agricultural fields and hardstanding farmland. Aerial imagery and mapping (Ref 4) indicate that the watercourse is culverted again when it reaches the railway line approximately 80 m downstream of the A458 road crossing. It is not clear from mapping or aerial imagery where this culvert discharges to.

Plate 11: Straightened reach of Oakenholt Brook

Summary of Ecological Value

1.2.73 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Allt-Goch Brook

1.2.74 Two unnamed tributaries of Pentre Brook are crossed by the Existing and Proposed CO_2 Connection Corridors. The larger has been named Allt-Goch Brook for the purpose of this assessment, which arises approximately 1.7 km south of the Main Site boundary, and drains a small catchment between Lead Brook and Pentre Brook. The watercourse flows in a northerly direction through a park and is then culverted beneath many residential roads, Chester road and the railway line to flow to Pentre Brook within the tidal zone of the River Dee Estuary.

1.2.75 The tributary arises near to Lead Brook Drive to the east of Allt-Goch Brook, and flows in a north-westerly direction and is culverted beneath residential roads and is assumed to join Allt-Goch Brook within the park.

Water quality

1.2.76 There are no NRW water quality data available for Allt-Goch Brook.

Flow

1.2.77 There are no NRW flow gauging stations or spot flow data on the Allt-Goch Brook. Hydromorphology

1.2.78 The tributary of Allt-Goch Brook was surveyed on the site walkover (26 March 2024). The watercourse was observed at the crossing of a track which runs between Lead Brook Drive and Coed Onn Road (NGR SJ 25798 71345). Upstream of the track the watercourse occupied a very small, poorly defined, informal channel that is likely dry for much of the year. The minor drainage channel was approximately 0.2 m wide and grassed. Downstream of the track the watercourse occupies a more formal, incised channel (

1.2.79 Plate 12**)**. Bed material appeared to comprise gravels. Some trees occupied the riparian zone, but short grassed pasture fields were dominant.

Plate 12: Allt Goch Brook approximately 650 m upstream of Proposed Development boundary

1.2.80 Allt-Goch Brook was also observed at the crossing of a track which runs between Lead Brook Drive and Coed Onn Road (SJ 25391 71092). Here the watercourse flowed through a small woodland (**Plate 13**). The watercourse appeared to have been straightened, likely to facilitate the track crossing. Little morphological diversity was observed, and the bed appeared silty.

Plate 13: Allt-Goch Brook flowing through wooded area at track crossing

1.2.81 Allt-Goch Brook was further observed within an incised channel at the edge of a housing development (NGR SJ 25717 71735) (**Plate 14**). The banks and riparian zone were grassed through the upstream length and appeared to be maintained with regular mowing. Bed sediment appeared silty and turbidity was higher, likely as a result of fine sediment from active construction of the

nearby housing development entering the watercourse via road drainage. The watercourse was culverted under a road within the housing development. Further downstream, gravel and coarser material was noted on the bed, and some minor riffle features provided some flow diversity. The watercourse is culverted under the A548, after which it flows adjacent to a boundary wall of a property, and onwards through grazed farmland.

Plate 14: Allt-Goch Brook flowing adjacent to houses, to the west of the Proposed Development boundary

Summary of Ecological Value

1.2.82 Information in relation to ecological value will be provided within the ES (see also **Chapter 11: Terrestrial and Aquatic Ecology** (**PEIR Volume II**).

Groundwater

1.2.83 The following sections provide a summary of the existing geology and ground conditions within the Site and 1 km study area. Further information on the geological baseline conditions are presented in **Appendix 14-A: Geo-environmental Assessment**.

Geology Summary

1.2.84 A summary of the geology within the study area can be found below; further information can be found in **Appendix 14-A: Geo-environmental Assessment**.

Made ground

1.2.85 Made Ground is present below: Main Site, Water Connection Corridor (partly), Electrical Connection Corridor, C&IEA, Access to Wildlife Hides (West), Access to Wildlife Hides (East), Existing Surface Water Outfall, and Alternative Access to Main Site and Access to C&IEA (partly).

1.2.86 The Made Ground is comprised of: clay, PFA, clayey sand and gravel and the occasional brick and concrete layers.

1.2.87 Made Ground has been recorded in the Main Site to be between 1.6 m to 3 m (Ref 6).

Superficial deposits

1.2.88 Superficial deposits are shown on **Figure 13-2 (PEIR Volume III)**.

1.2.89 There is a large area of Tidal Flat Deposits associated with the Dee Estuary, is located to the east of, and underlying, the A458 and the North Wales Main Line railway. The Tidal Flat Deposits comprise of unconsolidated silts, sands and clays and underlie the following Site areas: Main Site, Water Connection Corridor, Electrical Connection Corridor, C&IEA, Access to Wildlife Hides (West), Access to Wildlife Hides (East), Existing Surface Water Outlet, Access to Main Site, Alternative Access to Main Site and Access to C&IEA.

1.2.90 Glacial Till, comprising of diamicton, is mapped below the Proposed CO_2 Connection Corridor, the Repurposed CO_2 Connection Corridor and Access to Main Site.

1.2.91 Along the eastern boundary of the Proposed CO_2 Connection Corridor, Glaciofluvial Deposits comprising of sand and gravel are mapped.

1.2.92 In the wider study area there are isolated pockets of Head deposits (clay, silt, sand and gravel) and Glaciofluvial Deposits (sands and gravels).

1.2.93 Superficial deposits has been recorded in the Main Site to be between 6.7 m to 17.3 m (Ref 6).

Bedrock Geology

1.2.94 Bedrock Geology is shown on **Figure 13-3 (PEIR Volume III)**. The bedrock geology in the study area consists of heavily faulted and complex strata.

1.2.95 The Pennine Lower Coal Measures Formation (PLCMF) consists of mudstones, siltstones and pale grey sandstones. It is the predominant geology underlying the Site and the study area. PLCMF underlies, to different extents, each area of the Site. PLCMF- sandstone, outcrops along the Proposed CO_2 Connection Corridor, Electrical Connection Corridor and Alternative Access to Main Site and Access to C&IEA.

1.2.96 Etruria Formation (ETM) consists of conglomerates, lenticular sandstone and mottled mudstone and is located within the centre of the Main Site.

1.2.97 Gwespyr Sandstone Formation (GS) consists of fine grained micaceous and feldspathic sandstones and cross-stratified conglomerates with siltstone and mudstone beds. GS is located below the: Main Site, C&IEA and the Access to Main Site.

1.2.98 The Bowland Shale Formation is present within the study area but does not underlie the Site.

Aquifer Designations

1.2.99 The superficial deposits are dominated by low permeability silts and clays (Tidal Flat Deposits, Glacial Till and Head), and are classified as Secondary Undifferentiated Aquifers defined as 'layers previously designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.

1.2.100 Glaciofluvial deposits are designated as Secondary A Aquifers defined as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'.

1.2.101 The entire Site is underlain by bedrock aquifers designated as Secondary A Aquifers.

1.2.102 **Table 6** summarises the superficial and bedrock aquifers present within each area of the Site.

Table 6: Aquifer Designations

Site Area	Superficial Aquifer (geological strata)	Bedrock Aquifer (geological strata)
Main Site	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF, GS, ETM)
Proposed CO_2 Connection Corridor	Secondary Undifferentiated (Glacial Till) Secondary A (Glaciofluvial Deposits)	Secondary A (PLCMF inc. sandstone formation outcrop)
Repurposed CO_2 Connection Corridor	Secondary Undifferentiated (Tidal Flat Deposits and Glacial Till)	Secondary A (PLCMF inc. sandstone formation outcrop, GS)
Water Connection Corridor	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF)
Electrical Connection Corridor	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF inc. sandstone formation outcrop)
C&IEA	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF, GS)
Access to Wildlife Hides (West)	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF)
Access to Wildlife Hides (East)	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF)
Existing Surface Water Outlet	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A (PLCMF)
Access to Main Site	Secondary Undifferentiated (Glacial Till)	Secondary A (PLCMF, GS)
Alternative Access to Main Site and Access to C&IEA	Secondary Undifferentiated (Tidal Flat Deposits)	Secondary A

Site Area	Superficial Aquifer (geological strata)	Bedrock Aquifer (geological strata)
		(PLCMF inc. sandstone formation outcrop)
Study area only, does not underlie Site	Secondary Undifferentiated (Head Deposits)	Secondary Undifferentiated (Bowland Shale Formation)

Notes:

Made Ground is not designated as an aquifer.

Secondary A: 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'.

Secondary undifferentiated: 'layers previously designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.

Groundwater Levels and Flow

1.2.103 There is no groundwater level monitoring data available within the Proposed Development or the wider study area. Therefore, an indicative understanding of groundwater levels has been obtained from publicly available information held by the British Geological Survey (BGS), see **Table 7**. It should be noted, these water levels are not representative of current baseline conditions.

1.2.104 As expected, groundwater levels have been recorded to be shallow within the Made Ground and superficial deposits. It is unknown if the groundwater within the Made Ground and superficial deposits are in continuity. Groundwater flow within the Made Ground and superficial deposits is likely to be restricted by the presence of low permeability clays, silts and ash. Groundwater flow may occur, and be perched, in areas of higher permeability for example where sand/gravel/cobbles/bricks may be present.

1.2.105 There is one bedrock aquifer groundwater level reading within the Site Boundary. This groundwater level does not indicate that the groundwater within the bedrock is in continuity with the overlying superficial deposits and Made Ground. Groundwater flow within the bedrock aquifers is likely to be predominantly by fracture flow however, intergranular flow may occur in the higher permeability mapped PLCMF sandstone beds. Groundwater flow direction cannot be confirmed however it is likely to be towards the Dee Estuary and the Liverpool Bay (Irish Sea).

1.2.106 There have been several rounds of Ground Investigation (GI) undertaken within the Site, the latest GI was undertaken in January 2005 in the Main Site, which recorded groundwater levels in four boreholes within the superficial deposits. Recorded groundwater levels ranged between 1.76 mbgl (4.80 m AOD) to 3.83 mbgl (3.15 m AOD) (Ref 11).

1.2.107 As there are no continuous groundwater level data available, the tidal influence on the groundwater levels within the Made Ground, superficial deposits and bedrock are unknown.

Table 7: Historical Groundwater Levels

Borehole ID	Year	Geology	Groundwater level mbgl	Groundwater level mAOD	Comments
SJ27SE23	1967	Made Ground	0.3	5.6	Water strike
SJ27SE300	1990	Superficial deposits	4	2.6	Water strike, rose to 3.50 mbgl in 20 mins
SJ27SE301	1990	Superficial deposits	3	3.5	Water strike, did not rise
SJ27SE301	1990	Bedrock (sandstone)	12.30	-5.8	Strong groundwater inflow
SJ27SE16	1967	Superficial deposits	3.5	Unknown	Water strike

Source: Publicly available borehole logs from the BGS

Groundwater Source Protection Zones

1.2.108 The study area does not lie within a Source Protection Zone (SPZ).

Groundwater Quality

1.2.109 There is no groundwater quality monitoring data available within the Site Boundary or the wider study area.

1.2.110 The study area is located within the Dee Carboniferous Coal Measures WFD groundwater body (ID: GB41102G204800), this groundwater body was classified as being of 'poor' overall quality.

Groundwater Vulnerability

1.2.111 Groundwater vulnerability across the study area is typically high, although this varies and ranges from low to high. Further details on groundwater vulnerability can be found in Table 6 within **Appendix 14-A: Geo-environmental Assessment**.

Statutory Designated sites and ecology

Dee Estuary

1.2.112 The Dee Estuary is designated as a Ramsar site, a Special Protection Area (SPA), a Special area of Conservation (SAC) as designated under the Conservation of Habitats and Species Regulations 2017 (Ref 37), a Shellfish Water Protection Area (2022) (Ref 38) and as a site of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act (1981) (Ref 39).

1.2.113 Full details regarding the Dee Estuary designations are provided in **Chapter 12: Marine Ecology (PEIR Volume II).**

Marine Ecology Overview

1.2.114 Full details regarding marine ecology within the Site are provided in **Chapter 12 Marine Ecology (PEIR, Volume II)**. A summary is provided below.

1.2.115 In terms of fisheries, the Dee Estuary and River Dee is an important breeding, sheltering and nursery area for many coastal migratory fish species, including those which are listed as Species of Principal Importance (SOPI), as well as non-migratory fish populations.

1.2.116 Spawning and nursey grounds are generally present in the surrounding coastal areas, although some species may occur in the estuary. For example, plaice larvae enter estuarine nursery areas during the flood tide where they stay whilst metamorphosing into adults, at which point they move to coastal areas outside of the estuary due to their preference for sandy sediments.

1.2.117 Most recent benthic invertebrate surveys carried out by the Environment Agency in 2015 identified that the overall benthic composition across ten locations comprised of 31% molluscs, 25% nematodes, 23% annelids (polychaetes and oligochaetes), 19% crustaceans, and 1% Nermertea, with an overall good species diversity and abundance. These invertebrates provide an abundant food source for fish and are of particular importance for waterbirds.

1.2.118 One marine Invasive Non-Native Species (INNS), the Chinese mitten crab Eriocheir sinensis was identified during the desk study and is understood to be spreading throughout the mid and lower reaches of the River Dee. Although they primarily live in freshwater environments, it migrates downstream to brackish, estuarine and marine environments for reproduction.

1.2.119 The abundance of the Chinese mitten crab in the River Dee is shown to be increasing, from recordings taken from the Chester Weir fish trap.

Freshwater Ecology Overview

1.2.120 Full details regarding freshwater ecology within the Site are provided in **Chapter 11: Terrestrial and Aquatic Ecology (PEIR Volume II)**.

Groundwater dependent terrestrial ecosystems

1.2.121 The Water Connection Corridor is partially located within a groundwater-dependent terrestrial ecosystem (GWDTE) (Ref 35). The GWDTE is known as the Dee Estuary / Aber Afon Dyfrdwy.

Water Resources

1.2.122 This section contains information on water resources, including active permitted discharges, licensed water abstractions, and past environmental pollution incidents. There have been no bathing water sites identified within the Study Area. The information contained was provided by NRW publicly available data sources. A data request was sent to NRW, however no additional water resources were provided at the time of writing.

Drinking Water Safeguard Zones

1.2.123 The study area falls within the Dee Carboniferous Coal Measures groundwater body, which is a classified groundwater Drinking Water Protection Area (DrWPA). Drinking Water Protection Areas (DRWPA) is an area designated to safeguard the sources of drinking water. These areas are critical for maintaining water quality and ensuring safe drinking water for communities.

Nitrate Vulnerable Zones

1.2.124 A Nitrate Vulnerable Zone (NVZ) is an area designated to protect water from nitrate pollution. Regulations within the NVZs aim to reduce nitrate runoff into water features, safeguarding environmental and human health. The proposed development does not overlap with a NVZ.

Active Permitted Discharges

1.2.125 In addition to the current operation of the existing power station there are 15 active permitted discharges known within 1 km of the Proposed Development. Locations are shown within **Figure 13-6: Water Resources** (**PEIR Volume III**) and detailed further within **Table 8**.

1.2.126 The majority of the consented discharges are for sewage effluent from pumping stations and combined sewer overflows, whilst the remainder originate from trade effluent from industrial areas and sewage from a domestic landfill site.

Licensed Water Abstractions

1.2.127 In addition to the current operation of the existing power station, data provided by NRW indicates that there are four licensed water abstractions within 1 km of the Proposed Development. Locations shown within **Figure 13-6: Water Resources** (**PEIR Volume III**).

1.2.128 All four abstractions are related to surface water and no groundwater abstractions have been identified at this stage of the assessment and at the time of writing. If this information changes, further updates will be provided within the ES.

1.2.129 Three of the abstractions relate to industrial, commercial, and public services, including two abstractions for Essity UK Limited (paper production) abstracting from Lead Brook and Pentre Brook, an impoundment of the coastal Pentre Brook by Delyn Borough Council, and an abstraction from the tidal River Dee for the production of energy, which is licensed to the existing Connah's Quay CCGT.

Table 8: Active Permitted Discharges within 1 km of the Proposed Development

ID	Permit No	Issue date	Site Name	Description	Receiving Environment	Receiving Water	Easting	Northing
D1	BB3097HK	09/01/2019	Oakenholt HWRC	WA: Waste Site - Domestic Landfill Tip	Freshwater Estuary	River Dee Estuary	326319	371751
D2	CM0058401	31/03/2010	Flint WwTW	SA: Sewage Disposal Works – including a sewage pumping station at the head of a works	River, stream or ditch	Pandy Brook (Pentre Brook), Tidal Trib Of Dee	325788	372517
D3	CM0058402	27/05/2020	Settled Storm Sewage At Flint WwTW	SA: Sewage Disposal Works – including a sewage pumping station at the head of a works	Saline Estuary	River Dee Estuary	325780	372440
D4	CM0038701	17/12/2019	Oakenholt Main Sps	SC: Sewerage Network - Pumping Station - water company	River, stream or ditch	Pentre Ffwrndan Drain	325678	372147
D5	CM0086801	29/08/2019	Cestrian St CSO	SB: Sewerage Network CSO - water company	River, stream or ditch	Unnamed Watercourse Flowing To The River Dee	329732	369585
D6	CM0183501	10/07/1990	Papermill Lane Ps	SC: Sewerage Network - Pumping Station - water company	River, stream or ditch	Culverted Section of Lead Brook	326280	371720
D7	CM0164301	07/10/2019	Connahs Quay Deva Avenue - CSO	SB: Sewerage Network CSO - water company	Saline Estuary	River Dee	328738	369434
D8	CM0164401	26/02/2020	Connahs Quay Linden Avenue - CSO	SB: Sewerage Network CSO - water company	Saline Estuary	River Dee	328800	369499
D9	CM0164901	26/02/2020	Connahs Quay Dock Road Ps	SC: Sewerage Network - Pumping Station - water company	Saline Estuary	River Dee	329506	369885
D10	CM0165601	26/02/2020	Connahs Quay Golftyn Ps Cso/Storm	SC: Sewerage Network - Pumping Station - water company	River, stream or ditch	Golftyn Brook	328524	370377
D11	CG0322301	27/01/1992	Kelsterton Pump Stn.	SC: Sewerage Network - Pumping Station - water company	River, stream or ditch	The Kelsterton Brook	327900	370700

ID	Permit No	Issue date	Site Name	Description	Receiving Environment	Receiving Water	Easting	Northing
D12	CG0344101	29/09/1993	Dock Road Ps No 3 Dock Road Connah	SC: Sewerage Network - Pumping Station - water company	Saline Estuary	Dee Estuary	329470	369830
D13	CG0338201	01/03/1993	Dock Road Ps No 2 Dock Road Connah	SC: Sewerage Network - Pumping Station - water company	Saline Estuary	Dee Estuary	329880	369860
D14	CG0378901	12/02/2019	The Hedgerows Y Waen Flint Mountain	TF: Domestic Property (Multiple)	River, stream or ditch	Pentre Ffwrndan Via Sws	324350	370850
D15	BB3696ZC	15/02/2022	Oakenholt Mill	RB: Industrial estate	River, stream or ditch	Lead Brook	326303	371203
D16	EPR/NP3037AF	09/02/2007	Uniper UK Limited	Cooling water discharge – Thermal effluent	Saline Estuary	Dee Estuary	328500	371500

Note – The permitted discharge for the existing power station is not available on the NRW data catalogue for permitted discharges. Therefore, this information has been sourced from the current permit details provided.

Table 9: Licensed abstractions within the Study Area

ID	Permit No	Operator	Source	Location	Purpose	Easting	Northing
SW1	24/67/10/0079	Essity UK Limited	Surface Water	Reservoir (Lead Brook)	Industrial, Commercial, Public Services	326334	371176
SW2	24/67/10/0080	Essity UK Limited	Surface Water	Stream (Petre Brook)	Industrial, Commercial, Public Services	325525	372065
SW3	24/67/10/0099	Delyn Borough Council	Surface Water	Impounding weir (Pandy/Petre Brook)	Impounding	325750	372440
SW4	24/67/10/0124	Uniper UK Limited	Surface Water	Dee Estuary	Production of Energy	328430	371160

Private water supplies

1.2.130 Private water supply (PWS) is any water supply which is supplied to a property and does not originate from a mains supply or licensed water supplier. An abstraction license applies to anyone who wants to remove or abstract water from either an underground source or a surface source and wants to take more than 20 cubic metres a day will require an abstraction license from the relevant authority.

1.2.131 Details of PWS have been provided by Flintshire County Council, this indicates four PWS within the Study area, details of these these are provided in **Table 10**.

Table 10: FCC Private Water supplies

PWs Ref	Name	No. properties on supply	Source Type	Useage	Easting	Northing
P560/PWS/105	Nant Farm	2	Well	Domestic	323236	371112
P560/PWS/020	Coed Y Cra Mill	2	Spring	Domestic	323206	370289
P560/PWS/104	Leadbrook Cottage	1	Borehole	Domestic	326005	370412
D560/PWS/003	Tyn Y Coed*	10	Mains	Domestic	325470	369322

1.2.132 In addition, FCC have provided a list of 23 properties in the study area which are served by PWS. It is not clear the sources of these, and therefore further information is being sought. This should be available for the EIA.

Past Environmental Pollution Incidents

1.2.133 Pollution incidents are classified by NRW on the degree of manpower deploy (i.e. large, small) and likely environmental impact with regard to air, water and land. Incidents are classified as category 1 (major), 2 (significant), 3 (minor) or 4 (insignificant).

1.2.134 Four past environmental pollution incidents, two of Category 2 (Significant) and two of Category 3 (Minor), were identified within 1 km of the Proposed Development within the last 20 years NRW (Ref 26). Details are given within **Table 11** and locations are shown in **Figure 13-1: Surface Water Features** (**PEIR Volume III**).

Table 11: Pollution Incidents in the Study Area between 2005 and 2017

ID	Incident No	Incident Date	Incident Location	Receptor	Category	Easting	Northing
P1	296871	04/03/2005	Wepre Park (Flintshire)	Dee Estuary	3 (Minor)	329560	368364
P2	397313	09/05/2006	Connah's Quay	Dee Estuary	3 (Minor)	329811	369814
P3	1701700	03/04/2017	Wepre Park (Flintshire)	Dee Estuary	2 (Significant)	329590	368343

P4	1704991	19/09/2017	Wepre Park (Flintshire)	Dee Estuary	2 (Significant)	329946	368671

Flood Risk

1.2.135 The Main Site, Electrical Connection Corridor, C&IEA, Water Connection Corridor and the Repurposed CO_2 Connection Corridor are all entirely or partially situated on the south bank of the River Dee. These areas of the Site are potentially at risk from fluvial, tidal and, to a lesser extent, surface water flooding.

Development Advice Map

1.2.136 The appropriate reference for consideration of flood risk and development potential is the NRW Development Advice Map (DAM). The DAM shows areas at risk of flooding from rivers and the sea for the purposes of land-use planning. The DAM supports Planning Policy Wales (Ref 36) and Technical Advice Note (TAN) 15 (Ref 33) to guide new development away from areas at risk of flooding wherever possible. A development advice map containing three zones (A, B and C with subdivision into C1 and C2) defined below:

- **Zone A:** Considered to be at little or no risk of fluvial or tidal/coastal flooding;
- **Zone B:** Areas known to have been flooded in the past evidenced by sedimentary deposits; and
- **Zone C:** Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal):
  - **Zone C1:** Areas of the floodplain which are developed and served by significant infrastructure, including flood defences; and
  - **Zone C2:** Areas of the floodplain without significant flood defence infrastructure.

1.2.137 The DAM indicates that the majority of the south bankside sites on the River Dee are within Flood Zone C1, and hence considered to be at risk of tidal flooding during flood events of up to 1 in 1000 year frequency**.** The remainder of these sites are designated Flood Zone B.

1.2.138 The location and extent of Flood Zone C1 on the DAM suggests potential for flood inundation from the western boundary of the Main Site.

1.2.139 The Repurposed CO_2 Connection Corridor south of the A548, and the Proposed CO_2 Connection Corridor, are not located within a flood zone for the DAM.

1.2.140 It is noted that the DAM is due to be replaced by a new Flood Map for Planning[1]. The DAM presents undefended flood risk information (i.e. assuming that there are no existing flood defences). This approach allows for consideration of flood hazard related to failure or breach of defences.

[1] Welsh Government further suspended the coming into force of Technical Advice Note 15 in March 2023, which was due to come into effect in June 2023 due to the need for further consultation. The Welsh Government have not confirmed when the new TAN will come into effect.

Tidal and fluvial flood risk

1.2.141 Based on current guidance, the NRW Flood Map for Planning (FMfP) (Ref 12) should be used to assess potential flood risk to development, as it is the most up to date mapping available. In July 2023, the NRW Flood Map for Planning (FMfP) was updated to incorporate climate change estimates. The FMfP shows combined flood risk from rivers and the sea, and provides the following flood zones for rivers and sea:

- **Flood Zone 2:** The combined 0.1% (1 in 1000) risk of flooding from rivers and the sea including climate change; and
- **Flood Zone 3:** The combined 1% (1 in 100) risk of flooding from rivers and the sea including climate change.

1.2.142 The NRW FMfP rivers and sea mapping shows the Main Site, Water Connection Corridor, C&IEA and other areas near to the Dee Estuary to be predominantly Flood Zone 3 due to tidal flooding.

1.2.143 The southern part of the Repurposed CO_2 Connection Corridor is located within Flood Zone 3, associated with Lead Brook / the Tidal River Dee.

1.2.144 The Proposed CO_2 Connection Corridor is not indicated to be within a fluvial or tidal flood zone for NRW FMfP.

Surface water and small watercourse flood risk

1.2.145 The NRW FMfP (Ref 12) also shows flood risk from surface water and small watercourses. The NRW FMfP provides the following flood zones for surface water and small watercourses:

- **Flood Zone 2:** Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change; and
- **Flood Zone 3:** Areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

1.2.146 The NRW FMfP indicates areas within the Site Boundary are at risk of surface water flooding, particularly the C&IEA, the Alternative Access to Main Site and Access to C&IEA, and the Main Site (Flood Zone 2 and 3 - surface).

1.2.147 There is surface water flood risk to the east of the Proposed CO_2 Connection Corridor, which also intersects the Repurposed CO_2 Connection Corridor (Flood Zone 2 and 3 – surface).

Historic flood incidents

1.2.148 The NRW FMfP (Ref 12) indicates that there are no recorded incidents of historical flooding within the Site Boundary. The only recorded flood incidents in the area relate to localised flooding of small surface watercourses.

Reservoir flood risk

1.2.149 NRW provide reservoir flood risk maps (Ref 12). The shading on the map shows the worst-case scenario for the area that could be flooded if a large reservoir were to fail and release the water it holds. NRW state that reservoir flooding is extremely unlikely to happen.

1.2.150 The flood risk from reservoirs mapping indicates that the southern boundary of the Main Site is at risk from flooding from Oakenholt Reservoir.

Flood risk summary

1.2.151 A summary of flood risk is provided in **Table 12**.

Table 12: Proposed Development areas and flood risk zone

Site area	DAM flood zones	FMP flood zones (river and sea)	FMP flood zones (surface)
Main Site	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea) and Flood Zone 2 (sea).	Flood Zone 3 (Surface), and Flood Zone 2 (Surface)
Water Connection Corridor	Flood Zone C2	Flood Zone 3 (sea) and Flood Zone 3 (rivers)	Flood Zone 3 (Surface), and Flood Zone 2 (Surface)
Electrical Connection Corridor	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea)	Flood Zone 2 (Surface)
C&IEA	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea)	Flood Zone 3 (Surface), and Flood Zone 2 (Surface)
Alternative Access to Main Site and Access to C&IEA	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea)	Flood Zone 3 (Surface), and Flood Zone 2 (Surface)
Repurposed CO_2 Connection Corridor	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea) and Flood Zone 3 (rivers).	Flood Zone 3 (Surface), and Flood Zone 2 (Surface)
Access to Wildlife Hides	Flood Zone C1 and Flood Zone B.	Flood Zone 3 (sea)	None
Existing Surface Water Outfall	Flood Zone C2	Flood Zone 3 (sea)	Flood zone 3 (surface)
Proposed CO_2 Connection Corridor	None	None	None

1.3 Future baseline

1.3.1 The future baseline scenarios are set out in **Chapter 4: The Proposed Development (PEIR Volume II)**.

1.3.2 As a standard approach, the future baseline considers the existing power station as operational in the event that the Proposed Development does not

go forward. Therefore, the Proposed Development is assessed against the operation of the existing power station.

Construction

1.3.3 The future baseline has been determined qualitatively by considering the possibility of changes in the attributes that are considered when deciding the importance of water bodies in the study area.

1.3.4 As outlined in **Chapter 5: Construction Programme and Management (PEIR, Volume II)**, the construction of a single CCGT and CCP together with cooling and CO_2 compression infrastructure and associated development, could commence in 2026 and last for approximately four years. If progressed, the construction of an identical CCGT and CCP together with cooling infrastructure and associated development could commence in 2031 and last for approximately four years. These dates are currently indicative, and both these phases could commence together in 2030 and last for approximately five years.

Surface Water

1.3.5 It is likely that through new legislative requirements and more stringent planning policy and regulation, the water environment's health will broadly continue to improve, notwithstanding some very topical issues at the moment (e.g. sewerage discharges and microplastics etc.). There are, however, significant challenges such as adapting to climate change that are difficult to forecast these changes with certainty.

1.3.6 The Dee Estuary, as detailed within the Tidal Dee Catchment Action Plan 2022 (Ref 20), which supersedes an earlier version published in 2018, is said to be pursuing a number of initiatives that are in the development phase, or have begun, in order to meet the vision that *'…the Dee estuary is clean and full of wildlife, enjoyed by people and sustainably managed'.* As such, there is likely to be an improvement over current conditions due to interventions that are being implemented or have already been implemented. This includes the Dee Blue Recovery which aims to work with farmers across the Dee Catchment (England only) to identify sources of pollution and implement interventions, training local community groups on water quality, invertebrate analysis and chemical monitoring using data analysis; Dee Dairy Project which will work with farmers to reduce agricultural pollutions; Dee Invasive Non-native Species Project, a catchment-wide scheme to control and monitor INNS within the Dee Catchment; and Natural Capital and Ecosystems Services Project, relating to the assessment of blue carbon and potential to increase carbon stores.

1.3.7 Overall, the current receptor importance criteria presented in **Chapter 13: Water Environment and Flood Risk (PEIR Volume II)** are based on the presence or not of various attributes (e.g. water body size, WFD designation, ecological designations etc.) rather than current or future water quality, and these attributes are unlikely to change in future. Therefore, no significant changes to current baseline conditions are predicted for the future baseline in absence of the Proposed Development.

Groundwater

1.3.8 No significant changes to the current baseline condition are predicted for the future baseline for the same reasons as outlined above for surface water. The rise in groundwater level in coastal areas due to rising sea levels may extend saline intrusion.

1.3.9 Changes in groundwater abstractions could affect the groundwater flow regime and climate change could influence the future baseline conditions, due to changes on the rainfall regime, recharge, groundwater levels and flow. However, these changes are long-term and are not predictable at this stage.

Flood Risk

1.3.10 Climate change is predicted to alter both future tidal, fluvial and surface water flood risk and this has been taken into account within the Preliminary FCA (**Appendix 13-C**). Climate change resilience is accounted for, accommodating current government climate change projections, including peak river flow allowances, sea level allowances and peak rainfall intensity allowances.

Water Resources

1.3.11 Population growth and increased development may result in increased pressure upon surface water features, people, property, and infrastructure for water supply. Therefore, water abstraction and discharges volumes may increase overtime. However, considering the operational life of the Proposed Development, the increased pressure is unlikely to result in a considerable change to the baseline.

Operational

1.3.12 The same future baseline conditions expected during construction will apply to the operation phase (WFD targets, improving water quality, flood risk).

Decommissioning

1.3.13 It is considered that continued environmental improvements, tighter regulation at both national, regional and local scales, and environmental enhancements will lead to a gradual improvement over current baseline conditions in terms of water quality.

1.3.14 Climate change has the potential to significantly impact on drainage and flood risk, for example through increased storm intensity and changes in future rainfall patterns. However, the design of the Proposed Development will incorporate the climate change projections required by NRW so that potentially increased surface water flows are accounted for and managed across the lifetime of the Proposed Development. Therefore, it is assumed that there will be no significant adverse changes to current baseline conditions and so the impact assessment within this chapter is undertaken against existing baseline conditions.

1.4 Methodology

1.4.1 The scope of assessment includes impacts to surface water quality, water resources, fluvial hydromorphology, hydrogeology, flood risk and drainage.

1.4.2 The impact assessment has been undertaken in accordance with the following broad stages.

- reviewing the planning and legislation context;
- establishing the baseline context;
- identification and appraisal of potential impacts and determining the classification and predicting the significance of the effects (including an assessment of the confidence in prediction);
- identification of potential mitigation and enhancement measures; mitigation should be designed to limit or remove any significant adverse environmental effects of a development; and
- identification of likely remaining residual effects.

1.4.3 This section provides a description of the tools and techniques used to undertake the preliminary water environment impact assessment. It also outlines the significance criteria used with reference to any relevant legislation and/or guidance.

Approach Overview

1.4.4 There is no standard guidance in place for the assessment of the likely significant effects on the water environment from developments of this type. Based on professional judgement and experience of other similar schemes, a qualitative assessment of the likely significant effects on surface water quality and water resources has been undertaken.

1.4.5 The classification and significance of effects has been determined using the principles of the guidance and the criteria set out in the Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment (Ref 23) adapted to take account of hydromorphology. Although these assessment criteria were developed for road infrastructure projects, the overall approach is independent of the type of development and this method is suitable for use on any infrastructure project. It provides a robust and well tested method for predicting the significance of effects and has been applied to assess the effects of many types of development, including other power generation projects such as this.

Source-Pathway-Receptor Approach

1.4.6 The preliminary assessment of impacts will be undertaken using a source-pathway-receptor model:

- source – proposed Project change (e.g. release of chemical pollutant, physical impact to the form of surface water feature, or change in flood risk etc.);

- pathway – the method or route by which the source could affect the receptor; and
- receptor – the feature that may be affected by the outcomes of the Proposed Development.

1.4.7 In accordance with the stages of the methodology, there are three stages to the assessment of effects on the Water Environment, which are as follows:

- a level of importance (negligible to very high) is assigned to the water resource receptor based on a combination of attributes (such as the size of the watercourses, WFD designation, water supply and other uses, biodiversity and recreation etc.) and on receptors to flood risk based on the vulnerability of the receptor to flooding (see **Table 13**);
- the magnitude of potential and residual impact (classed as negligible, low, medium, or large adverse / beneficial) is determined based on criteria in **Table 14** and the assessor's professional judgement and the likelihood of the effect occurring. Potential impacts are those that occur having taken account of embedded measures, but before consideration of any required additional mitigation. Residual impacts are the remaining impacts having also taken account of the additional mitigation. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely; and
- a comparison of the importance of the receptor and magnitude of the impact (for both potential and residual impacts) results in an assessment of the overall significance of the effect on the receptor using the matrix presented in **Table 15**. The significance of each identified effect (both potential and residual) is classed as very large, large, moderate, slight or neutral and either beneficial or adverse significance. Where there is a range of effects (e.g., large / very large, see **Table 15**) professional judgement has been used to determine the residual effect.

1.4.8 A precautionary approach to the assessment has been undertaken so that where uncertainty currently lies with any assessment work, a reasonable worst-case assessment has been made to the identification of a particular effect's significance.

Receptor Importance

1.4.9 All the receptor categories identified below have been assessed within the study area. The potential receptors associated with the Proposed Development have been identified to include:

- surface water features (including WFD designated, Main Rivers and Ordinary Watercourse (including drains), estuaries and coastal water bodies);
- groundwater water bodies receptors;
- water resources, including reservoirs, water abstractions, and water supply; and
- flood risk receptors (including people, property and infrastructure).

1.4.10 The importance of a receptor is largely determined by its quality, rarity, and scale. Value is used preferentially for the water environment as low value receptors can sometimes be the most sensitive to change and this could lead to an inappropriately large effect. The importance and / or where appropriate, the importance of the receptors have been defined using the criteria outlined in **Table 13**.

Table 13: Importance (and Sensitivity) Criteria[1]

Importance	General criteria	Surface Water	Groundwater	Hydromorphology[2]	Flood Risk
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0m^3/s; site protected / designated under international or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site. Critical social or economic uses (e.g., public water supply and navigation).	Principal aquifer providing a regionally important resource and/or supporting a site protected under international and UK legislation Ecology and Nature Conservation. Groundwater locally supports GWDTE. Source Protection Zone (SPZ) 1	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.	Essential Infrastructure or highly vulnerable development.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 < 1.0m^3/s; Major Cyprinid Fishery; Species protected under international or UK habitat legislation. Critical social or economic uses (e.g., water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.	Principal aquifer providing locally important resource or supporting river ecosystem. Groundwater supports a GWDTE. SPZ - Note 2	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.	More vulnerable development.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.	Watercourse detailed in the Digital River Network but not having a WFD classification as shown in a RBMP. May be designated as a local wildlife site (LWS) and support a small / limited population of protected species. Limited social or economic uses.	Secondary aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3	Shows signs of previous alteration and/or minor flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	Less vulnerable development.
Low	The receptor is tolerant of change without detriment to its	Surface water sewer, agricultural drainage ditch; non-aquifer WFD Class 'Poor' or undesignated.	Unproductive strata	Substantially modified by past land use, previous engineering works or flow / water level regulation. Watercourses	Water compatible development.

Importance	General criteria	Surface Water	Groundwater	Hydromorphology[2]	Flood Risk
	character, is low environmental value, or local importance.	Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.		likely to possess an artificial cross-sector (e.g., trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.	
Negligible	The receptor is resistant to change and is of little environmental value	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Note 1: Professional judgement is applied when assigning an importance category to all water features. The WFD status of a watercourse is not an overriding factor, and, in many instances, it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and WFD targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, this does not mean that a poorer quality discharge can be emitted. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

Note 2: Based on the waterbody 'Reach Conservation Status' presently being adopted for a major infrastructure project (and developed originally by Atkins) and developed from Environment Agency conservation status guidance as LA113 does not provide any criteria for morphology.

Magnitude of Change

1.4.11 The magnitude of effects has been determined using a scale of (classed as negligible, minor, moderate, or major adverse / beneficial) seen in **Table 14**.

Table 14: Determining Magnitude of Change

Level of Magnitude	Definition of Magnitude and Examples
Large Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute. For example, loss of a fishery; decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status. Loss of regionally important public water supply. Change in flood risk to receptor from low or medium to high.
Medium Adverse	Results in impact on integrity of attribute, or loss of part of attribute. For example, partial loss of a fishery; measurable decrease in surface water ecological or chemical quality, or flow; reversible change in the yield or quality of an aquifer; such that existing users are affected, but not changing any WFD status. Change in flood risk to receptor from low to medium.
Low Adverse	Results in some measurable change in attribute's quality or vulnerability. For example, measurable decrease in surface water ecological or chemical quality, or flow; decrease in yield or quality of aquifer; not affecting existing users or changing any WFD status. Change in flood risk to receptor from no risk to low risk.
Negligible	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity. For example, negligible change discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity.
Low Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring. For example, measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD status. Change in flood risk to receptor from low risk to no risk.
Medium Beneficial	Results in moderate improvement of attribute quality. For example, measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status. Change in flood risk to receptor from medium to low.
Large Beneficial	Results in a major improvement of attribute quality. For example, measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users leading to an improvement in WFD status. Removal of an existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Change in flood risk to receptor from high to medium or low.
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance Criteria

1.4.12 The significance of environmental effect is typically a function of the value/importance of a receptor and the magnitude of an impact as set out in **Table 15**. Effects that are moderate or worse are typically considered significant in planning terms.

Table 15: Classification on Significance of Effect

Magnitude of change	Importance of receptor				
	Very High	High	Medium	Low	Negligible
Large	Major	Major	Moderate or Major	Minor or Moderate	Negligible
Medium	Major	Moderate or Major	Moderate	Minor	Negligible
Low	Moderate or Major	Minor or Moderate	Minor	Negligible to Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Water Framework Directive Assessment

1.4.13 A WFD screening and scoping assessment has been prepared for the Proposed Development. This is presented within **Appendix 13-B: Water Framework Directive Report.** The overarching aim of the WFD is to protect and enhance watercourses.

Flood Consequences Assessment (FCA)

1.4.14 A site-specific preliminary FCA has been prepared for the Proposed Development. This is presented within **Appendix 13-C: Flood Consequences Assessment**.

Rochdale Envelope

1.4.15 The setting of design parameters using the 'Rochdale Envelope' approach is described in **Chapter 4: The Proposed Development (PEIR Volume II)**, including Table 4-1 which sets out the maximum, and where relevant minimum, parameters currently under consideration for the main components of the Proposed Development. These parameters have been used to inform the representative worst-case scenario that has been assessed in this chapter, in order to provide a robust assessment of the impacts and likely significance of environmental effects of the Proposed Development at its current stage of design.

Assumptions and Limitations

1.4.16 The PEIR process enables good decision-making based on the best possible available information about the environmental implications of a project. However, there is often a degree of uncertainty as to the exact scale and nature of the environmental impacts and in such cases the worst-case scenario has been considered.

1.4.17 Limitations of this chapter are detailed below:

- the assessment has been undertaken using available data sources listed in this appendix, which are assumed to be an accurate representation of

the water environment of the Proposed Development and surrounding area at the time of writing. It is also based on understanding of flow pathways as observed during the surveys and site walkovers. Assumptions have been made regarding flow pathways for inaccessible and culverted sections of watercourses, based on OS mapping; and

- no water quality monitoring was undertaken, given that NRW holds water quality data for the receiving water bodies. If required, water quality and groundwater monitoring will take place prior to construction.

1.4.18 The following assumptions have been made for the construction phase of the Proposed Development:

- the contractor(s) will as a minimum conform to all permit / consent / license requirements and best practice measures to avoid, reduce and minimise the risk of water pollution or unacceptable physical impact (without mitigation) on water bodies;
- the final construction of laydown areas, accounting for exclusion zones, surface consideration, and security measures, will be confirmed based on the chosen technology and engineering, procurement, and construction (EPC) contractor;
- there may be minor field drains (likely ephemeral if present) present that are unmapped and not observed on the site visit.
- maintenance or minor upgrade works may be required for the existing surface water outfall adjacent to the Main Site. Additionally, the construction of additional permanent artificial structures solely for surface water drainage could be necessary in the immediate vicinity of the Existing Surface Water Outfall.
- due to the ongoing iterative design process, there are currently uncertainties around the works proposed and construction methodology to be undertaken within the Water Connection Corridor. The Water Connection Corridor covers the maximum area that would be required for the construction and operation of refurbishing, or fully replacing the cooling water infrastructure (the details of which will be further refined as the design and EIA studies progress). Therefore, it is assumed that the worst-case scenario is that replacement infrastructure is required;
- the Water Connection Corridor covers the area required for the potential construction and operation of a new intake and outfall infrastructure, if required;
- the cofferdam for the new abstraction and discharge infrastructure is expected to require 850 m of interlocking sheet piling within the Water Connection Corridor for the construction of new/replacement cooling water infrastructure and 750 m of interlocking sheet piling within the Water Connection Corridor for refurbishment of the existing cooling water infrastructure. Up to 1,000 m of additional interlocking sheet piling may be required within the Main Site for the installation of pipes to connect the

cooling water abstraction and discharge points to the Main Site if replacement pipes are required;

- based on available data, it is assumed that the sediments present in the Study Area are not contaminated. However, determination of this will be subject to the result of sediment sampling, which will be available to inform the ES (results are not available to inform the PEIR);
- sediment suspension and dispersion modelling will be included within the scope of the hydrodynamic modelling, however this will not be available at the PEIR stage and will instead be incorporated into the ES.

1.4.19 The following assumptions have been made for the operational phase of the Proposed Development:

- it is assumed that surface water at the Main Site and along the various corridors will be effectively segregated from potentially contaminated water sources. This segregation will be achieved through a detailed and robust drainage strategy, which is currently under development. This approach will be integrated into the design and operation of any permanent above-ground structures within the Proposed Development. The drainage strategy is subject to ongoing feasibility assessments and technical engagement, so that providing an adequate temporary drainage system is in place and maintained throughout the construction phase);
- if new cooling water infrastructure is required, it is assumed that permitted cooling water discharge temperature limits will be maintained;
- it is assumed that permitted abstraction rates will be maintained;
- all effluent will be treated in line with permitted requirements before discharge into watercourses.
- there will be no 3D thermal discharge modelling for the discharge of cooling water, as permitted cooling water discharge temperature limits will be maintained for the new or refurbished cooling water infrastructure;
- if new cooling water infrastructure is required (instead of refurbishment), it is assumed that the new cooling water infrastructure will not operate simultaneously with the existing cooling water infrastructure; and
- it is assumed that no maintenance dredging will be required for the operational phase. Instead, in the operational phase it is assumed that the intake and outfall infrastructure will be kept clear through the use of a compressed air blasting system, and if required a jet washing system which would be incorporated into the design. The air blast and jet washing activities would only take place on a falling tide to return the silt removed to the estuary sediment budget. Should these options not be sufficient to maintain clean flow through the screen, the use of retrievable screens for mechanical cleaning may be required. As a result, no allowance has been made in this PEIR for the consideration of maintenance dredging or disposal of dredged material arising as a result of the operation of the cooling water infrastructure.

1.4.20 The following assumptions have been made for the decommissioning phase of the Proposed Development:

- all assumptions considered to be the same as the construction phase.

1.4.1 Given the above assumptions, this assessment presents a reasonable 'worst-case' approach.

References

Ref 1. National Resources Wales (n.d.) Water Watch Wales Map Gallery [Online]. Available at: https://waterwatchwales.naturalresourceswales.gov.uk/en/

Ref 2. Met Office (n.d) UK Climate Averages [Online]. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcmys019j

Ref 3. Bing (n.d.). Maps [Online]. Available at: https://www.bing.com/maps

Ref 4. Online Ordnance Survey (OS) maps [Online]: Available at: https://www.gov.uk/government/organisations/ordnance-survey

Ref 5. Multi-Agency Geographic Information for the Countryside (MAGIC) [Online]. Available at: https://magic.defra.gov.uk/home.htm

Ref 6. UK Centre for Ecology & Hydrology (n.d.). National River Flow Archive [Online]. Available at: https://nrfa.ceh.ac.uk/. Accessed May 2024.

Ref 7. Natural Resources Wales (n.d.). River Levels, rainfall and sea data [online]. Available at: https://rivers-and-seas.naturalresources.wales/. Accessed May 2024.

Ref 8. Soil Mechanics Limited (1991) Site Investigation for North West Sites Alternative 'A'.

Ref 9. British Geological Survey (n.d.) Geology of Britain Viewer [Online]. Available at: https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/ Accessed April 2024.

Ref 10. British Geological Survey (1999) Sheet 108 Flint Solid and Drift [Online]. Available at: https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1003692

Ref 11. Unknown (2005) Connah's Quay Site Report for PPC Application- MP3337SH.

Ref 12. Natural Resources Wales (n.d). Flood Map for Planning [online]. Available at: https://flood-map-for-planning.naturalresources.wales/

Ref 13. Natural Resources Wales (2020). Development Advice Map [online]. Available at: https://gisgeoext.cyfoethnaturiolcymru.gov.uk/Geocortex/Viewers/Html5Viewer_4145/index.html?viewer=FloodRisk

Ref 14. Natural Resources Wales (n.d.). Flooding from Reservoirs [Online]. Available at: https://naturalresources.wales/flooding/managing-flood-risk/flood-risk-map-guidance/risk-of-flooding-from-reservoirs/?lang=en

Ref 15. Natural Resources Wales (2020). Flood and Coastal Erosion Risk Maps [Online]. Available at: https://flood-risk-maps.naturalresources.wales/?locale=en

Ref 16. Flintshire Local Flood Risk Management Strategy 2013 [Online]. Available at: https://committeemeetings.flintshire.gov.uk/documents/s16847/Appendix%204%20-%20Flood%20Risk%20HL.pdf

Ref 17. Flintshire Strategic Flood Consequence Assessment 2018 [Online]. Available at; https://www.siryfflint.gov.uk/en/PDFFiles/Planning/Evidence-Base-Documents/Natural-Built-Environment/LDP-EBD-EN1-Strategic-Flood-Consequences-Assessment-Final-Report-2018.pdf

Ref 18. North West & North Wales Coastal Group (2011). North West England and North Wales Shoreline Management Plan SMP2

Ref 19. Sefton Council (2013). Dee Estuary: North West Estuaries Processes Reports. Prepared by CH2MHill for Sefton Council.

Ref 20. Catchment Based Approach (2022) Tidal Dee Catchment Action Plan [Online]. Available at: https://catchmentbasedapproach.org/wp-content/uploads/2022/03/Tidal-Dee-Catchment-Action-Plan-March-2022.pdf

Ref 21. The Deeside Plan 2017 [Online]. Available at: https://www.flintshire.gov.uk/en/PDFFiles/Business-AdviceGuidance/Deeside-Plan-A4-v13.2.pdf

Ref 22. Dee River Basin Management Plan 2021-2027 [Online]. Available at: https://naturalresources.wales/evidence-and-data/research-and-reports/water-reports/river-basin-management-plans/river-basin-management-plans-2021-2027?lang=en Accessed May 2024

Ref 23. DMRB LA 113 Road Drainage and the Water Environment [Online]. Available at: https://www.standardsforhighways.co.uk/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true

Ref 24. Welsh Government (2024). Data Map Wales: Licenced Water Abstractions [Online]. Available at: https://datamap.gov.wales/layers/geonode:nrw_water_resource_permits. Publication date 18 April 2024

Ref 25. Welsh Government (2024). Data Map Wales: Permitted Discharges to Controlled Waters with Conditions [Online]. Available at: https://datamap.gov.wales/layers/geonode:nrw_water_quality_permits. Publication date 18 April 2024.

Ref 26. Welsh Government (2024). Data Map Wales: Environmental Pollution Incidents [Online]. Available at: https://datamap.gov.wales/documents/2642. Publication date 19 February 2024.

Ref 27. Environment Agency, 2016. Water Framework Directive risk assessment: How to assess the risk of your activity. [Accessed 9th April 2024].

Ref 28. Environment Agency (2016b). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers. [Accessed 1st February 2024].

Ref 29. National Infrastructure Planning (NIP), 2017. The Planning Inspectorate (2017). Advice Note eighteen: The Water Framework Directive. Available from: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/. [Accessed 1st February 2024].

Ref 30. Clearing the Waters for All (2016) [Online]. Available at: Water Framework Directive assessment: estuarine and coastal waters - GOV.UK (www.gov.uk)

Ref 31. DESNZ, 2023; Overarching National Policy Statement for Energy (EN-1) [online]. Available at: https://assets.publishing.service.gov.uk/media/65a7864e96a5ec0013731a93/overarching-nps-for-energy-en1.pdf (Accessed 26/02/24)

Ref 32. DESNZ, 2023; National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) [online]. Available at: https://assets.publishing.service.gov.uk/media/655dc2d4046ed4000d8b9dd9/nps-natural-gas-supply-infrastructurepipelines-en4.pdf (Accessed 26/02/24)

Ref 33. TAN 15: Development, flooding and coastal erosion 2021 [Online] Available at; https://www.gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion

Ref 34. Water Framwork Directive (WFD) Regulations Cycle 3 Classification [Online] Available at; https://www.data.gov.uk/dataset/af2d8523-e70b-4597-a800-19efaccd1e7c/water-framework-directive-wfd-regulations-cycle-3-classification

Ref 35. Guidance on the identification and risk assessment of groundwater dependent terrestrial ecosystems [Online] Available at; https://wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Risk%20assessment%20of%20terrestrial%20ecosystems%20groundwater_Draft_210104.pdf

Ref 36. Welsh Government, 2021; Planning Policy Wales: Edition 11 [online] Available at; https://www.gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf (Accessed 26/02/24)

Ref 37. The Conservation of Habitats and Species Regulations 2017 [Online] Available at; https://www.legislation.gov.uk/uksi/2017/1012/contents/made

Ref 38. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [Online] Available at; https://www.legislation.gov.uk/uksi/2017/407

Ref 39. Wildlife and Countryside Act 1981 [Online] Available at; https://www.legislation.gov.uk/ukpga/1981/69/contents

Ref 40. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 [Online] Available at; https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en_auto.pdf

Ref 41. Welsh Government (2024). Data Map Wales: NRW Water Quality Archive [Online] Available at; https://datamap.gov.wales/layers/geonode:nrw_water_quality_archive_stations

Ref 42. HMSO (2002) The Control of Substances Hazardous to Human Health (COSHH) Regulations 2002 [Online]. Available at; https://www.legislation.gov.uk/uksi/2002/2677/pdfs/uksi_20022677_en.pdf

Ref 43. Environmental Permitting (England and Wales) Regulations 2016 (as amended 2017 & 2018) [Online] Available at; The Environmental Permitting (England and Wales) Regulations 2016 (legislation.gov.uk)

Ref 44. Water Abstraction and Impounding (Exemptions) Regulations 2017 [Online], Available at: https://www.legislation.gov.uk/uksi/2017/1044/contents

Connah's Quay Low Carbon Power

Preliminary Environmental Information Report
Volume IV, Appendix 13-B: Water Framework Directive Screening and Scoping Assessment Report

Uniper

The Planning Act 2008
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
PINS Reference: EN010166
September 2024

Delivering a better world

Prepared for:
Uniper UK Limited

Prepared by:
AECOM Limited

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1. Introduction

1.1 Background

1.1.1 The Proposed Development comprises the demolition of an existing gas treatment plant (GTP) and above-ground installation (AGI), store buildings, and contractors' facilities on site and the construction, operation and maintenance of a Combined Cycle Gas Turbine (CCGT) generating plant with Carbon Capture Plant (CCP) including the Proposed CO_2 AGI described in section 4.2 of **Chapter 4: The Proposed Development (PEIR Volume II)**. Demolition works and construction works for the Proposed Development are described in **Chapter 5: Construction Programme and Management (PEIR Volume II)**. The connection corridors for CO_2, cooling water, and electricity described herein are shown on figures accompanying **Chapter 5: Construction Programme and Management (PEIR Volume II)** and **Chapter 3: Description of the Existing Environment (PEIR Volume II)**.

1.1.2 This Water Framework Directive (WFD) Screening and Scoping assessment Report is being carried out as part of the Preliminary Environmental Information Report (PEIR) so that statutory bodies can be consulted on the need for, and scope of any further, more detailed stages of WFD assessment.

1.1.3 More detail on the key elements on the site is provided in **Chapter 4: The Proposed Development (PEIR Volume II) and Chapter 13: Water Environment and Flood Risk (PEIR Volume II).**

1.2 Study Area

1.2.1 The Indicative Site Boundary is located north-west of Connah's Quay in Flintshire, north-east Wales. The Indicative Site Boundary is shown on **Figure 3-1: Indicative DCO Site (PEIR Volume III)**.

1.2.2 The study area represents a Zone of Influence (ZOI) that has been defined to include water environment bodies likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development. The potential ZOI is 1 km from the Indicative Site Boundary (Excluding the Temporary Abnormal Indivisible Load (AIL) Work Areas) and forms the Study Area, as shown in **Figure 13-1: Surface Water Features (PEIR Volume III)**.

1.2.3 During the scoping assessment, as described in Chapter 11 Water Environment and Flood Risk of the Scoping Report (**Appendix 1-A**), a 2 km ZOI was initially considered. However, it has since been found that there are no hydrological connections to water features between 1 km and 2 km distance, therefore a reduced ZOI has been considered only. However, as noted above, downstream water features and their attributes have been considered within the assessment.

1.2.4 The Indicative Site Boundary is contained within the Dee Estuary WFD Operational Catchment, within the Dee Management Catchment. In total, the study area includes four WFD waterbodies, including two surface WFD waterbodies, one transitional WFD water body and one groundwater body:

- Dee (N.Wales) Transitional Water Body (GB531106708200); and
- Dee Carboniferous Coal Measures Groundwater Body (GB1102G204800).

1.2.5 There is a large area of the study area which does not fall within a WFD water body catchment, but watercourses within this area ultimately flow into the Dee (N.Wales) Transitional Water Body which will be assessed as part of this WFD Screening and Scoping assessment report.

1.3 Introduction to the Water Framework Directive

1.3.1 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 1), commonly referred to as the Water Framework Directive (WFD), aims to protect and enhance the water environment. The WFD is transposed in England and Wales and, following the departure of the United Kingdom from the European Union, these regulations continue to apply until they are revoked or superseded by new legislation.

1.3.2 The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

1.3.3 Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Waterbodies form part of a larger 'river basin district' (RBD), for which 'River Basin Management Plans' (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs at the date of this assessment are the 2021 Cycle 3 plans, and the most recent RBMP data available is from 2022. The Proposed Development interacts with the Dee RBMP.

1.3.4 In Wales, Natural Resources Wales (NRW) is the competent authority for implementing the WFD, although many objectives are delivered in partnership with other relevant public bodies and private organisations, for example local planning authorities, water companies, rivers trusts, and private landowners and developers.

1.3.5 NRW is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are responsible for consenting certain activities on Ordinary Watercourses. Local planning authorities are responsible for highways drains, and landowners are responsible for ditches and watercourses and also piped watercourses and culverts. While NRW is ultimately responsible for the WFD on any water body, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

1.3.6 As part of its regulatory and statutory consultee role on planning applications and environmental permitting (under the Environmental Permitting Regulations (England and Wales) 2016) (Ref 2) NRW and WFD-partnering

organisations must consider whether proposals for new developments have the potential to:

- cause a deterioration of any quality element of a water body from its current status or potential; and / or
- prevent future attainment of good status or potential where not already achieved.

1.3.7 Regulation 33 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 1) states that, like other public bodies, local authorities have a statutory duty to have regard to the "River Basin Management Plan" and "any supplementary plans" covering proposed activities when exercising its functions. Local authorities must therefore reflect water body improvement priorities as outlined in RBMPs.

1.3.8 In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, NRW and partnering organisations must also consider the conservation objectives of any Protected Areas (i.e. Natura 2000 sites or water-dependent Sites of Special Scientific Interest (SSSIs)) and adjacent WFD water bodies, where relevant.

2. Methodology

2.1 Approach

2.1.1 There are no fixed methods for WFD assessment. The nature of the water environment and the breadth of the legislation mean that assessments are tailored to proposals on a case-by-case basis.

2.1.2 There is no Welsh guidance or guidance produced by NRW for WFD assessment, so Environment Agency, Planning Inspectorate (Ref 5) and Clearing the Waters for All (Ref 6) guidance has been used instead. The following general guidance is available which has been applied for this assessment:

- Environment Agency (2016). Water Framework Directive risk assessment. How to assess the risk of your activity (Ref 3);
- Environment Agency (2016). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers (Ref 4);
- The Planning Inspectorate (2017). Advice Note eighteen: The Water Framework Directive (Ref 5); and
- Environment Agency (2016c). Water Framework Directive assessment: estuarine and coastal waters. Clearing the Waters for All (Ref 6).

2.1.3 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. The general approach is described by The Planning Inspectorate (Ref 5) and briefly summarised below.

2.1.4 This WFD Screening and Scoping assessment Report, identifies requirements (if any) for WFD impact mitigation commitments in the planning submission, and identifies requirements for further WFD impact assessment at future design stages.

Stage 1 Screening

2.1.5 Screening identifies the ZOI of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

Stage 2: Scoping

2.1.6 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

Stage 3: Impact Assessment

2.1.7 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

Mitigation Commitments

2.1.8 Proposed mitigation activities relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through planning licence conditions, Development Consent Orders (DCOs), or other legally binding methods.

Regulation 19 Derogation

2.1.9 Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided, additional assessment is needed in the context of WFD Regulation 19 which covers procedures for WFD derogation.

2.1.10 Regulation 19 is a 'last resort' planning and legal process, and it is a matter for the Secretary of State to consider whether derogation under Regulation 19 is justified. An applicant would be required to provide detailed and often complex evidence to justify its case that the following four stringent tests have been met:

- Test (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned;
- Test (b): the reasons for modifications or alterations are specifically set out and explained in the RBMP;
- Test (c)(1): There is an overriding public interest in the Proposed Development and/or Test (c)(2): its benefits outweigh the benefits of the WFD objectives (i.e. that the benefits of the project to human health, human safety or sustainable development outweigh the benefits of achieving the WFD objectives); and
- Test (d): The benefits of the project cannot be achieved by a significantly better environmental option (that are technically feasible and do not lead to disproportionate cost.

2.1.11 In addition, the Proposed Development must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other environmental legislation. In applying Regulation 19, steps must also be taken to make sure that the new provisions guarantee at least the same level of protection as the existing legislation.

2.2 Desk Study

2.2.1 A desk-based study was carried out to capture information pertaining the Proposed Development that is not attainable through site survey. Review of relevant information relating to the study area was undertaken to develop a baseline for WFD catchments, watercourses and surrounding areas. The following data sources were used for the desk study:

- National Resources Wales WFD data, available from the Water Watch Wales website (Ref 7);
- Historical maps (Ref 8);
- Geology (Ref 9) and soil data (Ref 10);
- Natural environment maps and designations on the MAGIC website (Ref 11);
- Hydrological information (Ref 12); and
- Climate information (Ref 13).

2.3 Field Survey

2.3.1 A site walkover was undertaken on 26th March by a water scientist and geomorphologist. A summary of the site walkover is provided in **Appendix 13-A: Water Baseline and Methodology.**

2.4 Limitations and assumptions

2.4.1 This WFD assessment has been undertaken based on the design information of the Proposed Development that is provided in **Chapter 4: The Proposed Development (PEIR Volume II)**. Where there is uncertainty in the design, reasonable assumptions have been made and these are described at relevant points within this assessment. Further assessment or updates may therefore be required if there are material changes to the design elements post planning.

2.4.2 The latest WFD classification data for Cycle 3 from 2021 has been used within this screening and scoping assessment, however it is anticipated that an interim classification for WFD water bodies is due in 2024 and the final assessment will be based on the most up to date information available.

3. Baseline Desk Study

3.1 Introduction

3.1.1 The baseline conditions for the study area have been summarised below. For a more detailed report of the baseline conditions for the study area, refer to **Appendix 13-A: Water Baseline and Methodology**.

3.2 Topography and Land-use

3.2.1 The Main Site, Electrical Connection Corridor and C&IEA are characterised by flat, low-lying coastal topography with typical ground levels of approximately 6 m to 8 m Above Ordnance Datum (AOD). The Water Connection Corridor is similar to the aforementioned sites, with the northern portion extending out into the lower marshland and River Dee channel to the north (approximately 3 m to 4 m AOD).

3.2.2 The Main Site, Electrical Connection Corridor, C&IEA and Water Connection Corridor are bounded to the south-west by the North Wales Main Line railway and to the north-east by the River Dee and associated floodplain/marshland. The A548 passes over the River Dee between The Main Site/Water Connection Corridor and C&IEA.

3.2.3 The Repurposed CO_2 Connection Corridor extends from the Main Site rising upslope towards the Proposed CO_2 Connection Corridor (ground levels ranging from approximately 36 m AOD to 48 m AOD).

3.2.4 The land use in the south-east of the Main Site is predominantly industrial, containing the existing Connah's Quay Power Station, with arable/grasslands surrounding the site to the west, and the River Dee to the north. The C&IEA is constrained by the River Dee to the north and east, with the remainder surrounded by built-up land, with the power station to the north-west and the residential areas of Kelsterton and Golftyn to the south-west.

3.3 Designated Sites

3.3.1 The Indicative Site Boundary is located within multiple designated areas. These include the Dee Estuary Ramsar, the Dee Estuary SSSI and the Dee Estuary Special Area of Conservation (SAC) and Special Protection Area (SPA).

3.3.2 Within the study area, there is also the presence of saltmarsh, considered a high sensitivity habitat within the Clearing Waters for All WFD assessment guidance (Ref 6).

3.4 Catchment Geology and Soils

3.4.1 Underlaying the watercourses within the study area, the bedrock geology is mixed. The majority is of the Indicative Site Boundary is underlain by Pennine Lower Coal Measures formation (mudstone, siltstone and sandstone) with a band of Etruria formation (mudstone, sandstone and conglomerate) and the Gwespyr Sandstone (sandstone and (Subequal/Subordinate) Argillaceous

Rocks, interbedded) to the west. The Bowland Shale Formation (mudstone) is present within the study area but does not underlay the Proposed Development.

3.4.2 Superficial geology deposits within the study area are comprised of Tidal Flat Deposits of clay, silt and sand.

3.5 Catchment Hydrology

3.5.1 Hydrology is taken from the Dee at Chester Suspension Bridge which is upstream of the site and the transitional water body. River flow is reflective of the moderately high catchment size of 1800 km^2, at 34.078 m^3/s mean flow. At this station, there is a baseflow index of 0.5, Q95 of 5.13 m^3/s, Q5 of 119 m^3/s.

3.5.2 Annual average rainfall is from Hawarden Airport (Ref 13), approximately 6.9 km south-east of the Proposed Development. From 1991 – 2020, there has been an average annual rainfall of 728 mm per year, with the wettest months in October, November and December. This is lower than the UKs average annual rainfall of 1162 mm.

3.6 WFD Status

3.6.1 The study area falls within the Dee (N. Wales) Transitional Water body and tributaries of this water body. Further details regarding the WFD classifications of this water body are given in **Table 1**.

Table 1: Summary of the WFD status of the Dee (N. Wales) Transitional Water Body

WFD Parameter	Status / Summary
Water Body ID	GB531106708200
Water Body Name	Dee (N. Wales)
Water Body Type	Transitional
Water Body Area (km^2)	305.8
Water Body Length (km)	334.7
Hydromorphological Designation	Heavily Modified
Overall Ecological Status	Good
Current Overall Status	Moderate
Status Objective	Good by 2027

3.6.2 The study area falls within two WFD river water bodies. Further details regarding the WFD classifications of this water body are given in **Table 2**.

Table 2: Summary of the WFD status of the WFD surface water bodies

WFD Parameter	Status / Summary	Status / Summary
Water Body ID	GB111067056880	GB111067056940
Water Body Name	Wepre Brook	Swinchiard Brook
Water Body Type	River	River

WFD Parameter	Status / Summary	Status / Summary
Water Body Area (km^2)	58.1	68
Water Body Length (km)	59.5	49.
Hydromorphological Designation	Natural	Natural
Overall Ecological Status	Moderate	Good
Current Overall Status	Moderate	Good
Chemical Status	High	High

3.6.3 The study area overlies the Dee Carboniferous Coal Measures Groundwater body. Further details regarding the WFD classifications of this water body are given in **Table 3**.

Table 3: Summary of the WFD status of the Dee Carboniferous Coal Measures Groundwater body

WFD Parameter	Status / Summary
Water Body ID	GB41102G204800
Water Body Name	Dee Carboniferous Coal Measures
Water Body Type	Groundwater
Water Body Area (km^2)	1184
Hydromorphological Designation	Natural
Overall Ecological Status	Good
Current Overall Status	Poor
Chemical Status	Poor

4. Screening

4.1 Screening of WFD water bodies

4.1.1 The Proposed Development interacts with a number of WFD surface water and groundwater bodies. WFD Screening of these water bodies is provided in **Table 4**.

Table 4: Screening of WFD Water Bodies potentially impacted by the Proposed Development

Water Body ID	Screening Outcome	Justification
Dee (N.Wales) GB 531106708200	In	The footprint of the Proposed Development interacts with this waterbody. Thus, there is a risk to WFD quality elements and the ecological and chemical status of the receptor water body.
Wepre Brook GB 111067056880	Out	The Proposed Development does not encroach on these water bodies and is not hydrologically connected, and therefore they are screened out of further assessment.
Swinchiard Brook GB 111067056840		
Dee Carboniferous Coal Measures GB 41102G204800	In	The WFD groundwater body underlays the Proposed Development and therefore may be impacted.

4.2 Screening of activities

4.2.1 The Proposed Development comprises a number of activities which may present a potential risk to the WFD status of water bodies. These activities are listed in **Table 5**.

Table 5: Screening of the Proposed Development's Activities against WFD Quality Elements

Activity	Description	Screening Outcome	Justification
Main Site	The Main Site will consist of a CCGT and post-combustion CCP. The Proposed Development is expected to comprise up to two new 'Trains' of CCGT plant (with a net electrical output capacity of up to 1,380 MW) with (post-combustion) CCP. The CCP is likely to consist of the following principal infrastructure: • exhaust gas cooling and conditioning plant; • flue gas blower/ centrifugal fans (may not be required); • exhaust gas treatment including Selective Catalytic Reduction (SCR); • absorber column(s) including water and acid wash and associated stack(s); • heat exchangers; • solvent reclaimer tower; • reboiler;	**In** Dee (N.Wales) GB 531106708200 Dee Carboniferous Coal Measures GB 41102G204800	The Main Site has a high groundwater table and any implications of this on contamination will be considered within the Environmental Statement (ES). Therefore, for precautionary purposes, this element is screened in for further assessment due to potential impacts to the Dee Carboniferous Coal Measures groundwater body. Given the nature of the former site operations, it is possible that subsurface contamination may be present at the Main Site and a soil and groundwater investigation would be undertaken prior to commencing construction. The design and extent of this investigation would be based on the revised design for the Proposed Development and would be conducted to also provide the necessary information to inform the requirements of an Environmental Permit that is required by NRW for the operation of the Proposed Development. Full details regarding excavation depth and method for the Main Site are not known at this stage. Until full details are available, this element is screened in for further assessment. A technical study to assess the risk of flooding at the Main Site will inform the flood risk assessment that will accompany the Application. It is currently anticipated that some targeted ground raising may be required to increase ground levels above the existing average ground height of between 6.8 m to 7.0 m AOD in order to protect critical operational infrastructure from flood events and considering the effects of climate change. Additionally, permanent above ground infrastructure is anticipated at the Main Site. Any permanent above ground infrastructure will have a surface water drainage strategy, further details will be provided in the ES. The contractor would prepare a Construction Environmental Management Plan (CEMP) for the construction stage which would cover any drainage requirements for the construction phase. A closed drain waste collection and disposal package is required for acid, amine and reflux drain effluent from the CCP. Disposal shall be by vacuum truck connection to off-

Activity	Description	Screening Outcome	Justification
	• lean and rich solvent storage tanks (to enable high capture rate during start-up); • cooling provision for both the CCGT and CCP which is likely to comprise either through an air-cooled condenser array or additional hybrid cooling system including towers and associated infrastructure, subject to ongoing technical studies; • chemical and waste storage facilities (including for hazardous materials); • CO_2 cooling and compression plant; • effluent treatment plant; and • ducting and pipework. In addition to the electrical generating plant, the following infrastructure is likely to be required: • administration building; • electrical control room; • workshops; • above-ground chemical storage tanks; • stores; • fire pumps;		site disposal. Drain drums shall be supplied with sufficient volume of drained fluids plus a safety margin with the final capacities confirmed at later project phases. There is no existing sewerage connection for grey and black (i.e. non-cooling) wastewater export from the Main Site. Black and grey wastewater (i.e. non-cooling and non-process wastewater) from the existing Connah's Quay Power Station is currently directed to an underground cesspit and filtration system for storage and settling, which is emptied periodically by a specialist contractor (approximately once per six-month period). It is expected that the Proposed Development will utilise a new similar cesspit and filtration system for black and grey wastewater. All wastewater is expected to be treated prior to being discharged into watercourses. A new fire suppression system shall be designed specifically for the project to avoid reliance on the existing system. This is expected to include a firewater tank, a fire water pump (electric), fire water access points (monitors, hydrants, sprinkler systems, etc.). Firewater will be collected within site drains or within bunded areas during operation, emission to the environment is to be avoided. The terminal points of the connection to existing potable/ towns water import connection is located within the Main Site and expected to be re-used for the Proposed Development. Any additional connections for the Proposed Development would be within the Main Site downstream of this terminal point.

Activity	Description	Screening Outcome	Justification
	• cooling water pumps; • above-ground raw and fire water tank; • staff offices and welfare facilities; • permanent laydown; • internal access roads; • gatehouse(s); and • parking areas (including electric vehicle chargers). It is assumed that the above and below ground structures currently on the Main Site will be removed, cleared and remediated to a suitable development platform level as determined through technical studies.		
Repurposed CO_2 Connection Corridor	The Proposed Development will utilize approximately 3 km of the overall 27 km existing pipeline route.	**In** Dee (N.Wales) GB 531106708200 Dee Carboniferous Coal Measures GB 41102G204800	It is anticipated that the Repurposed CO_2 Connection Corridor pipeline is in suitable condition for re-use, however, technical studies which are ongoing may confirm potential re-routing, refurbishment or access improvements. Potential re-routing within the Repurposed CO_2 Connection Corridor may require open-cut crossings of watercourses, which could result in localised loss of riparian habitat, impacts to channel morphology and pollution during construction works. Therefore, this activity is screened in for further assessment.
Proposed CO_2 Connection Corridor	Captured CO_2 emissions from the Proposed Development will be discharged from the Repurposed CO_2 Connection	**In** Dee Carboniferous Coal Measures GB 41102G204800	The final location and routing of the Proposed CO_2 Connection is subject to ongoing technical studies. Therefore, this element is screened in for further assessment.

Activity	Description	Screening Outcome	Justification
	Corridor, via a new circa 350 m pipeline spur (the Proposed CO_2 Connection) into Flint Above Ground Installation (AGI).	Dee (N.Wales) GB 531106708200	
Water Connection Corridor (and cooling water abstraction)	Cooling water for the Proposed Development will be abstracted from and discharged to the River Dee, in-line with the current process for the existing Connah's Quay Power Station CCGT. Cooling water abstraction and discharge will be limited to periods around high water in line with the current abstraction permit. Cooling water will be abstracted at a rate of up to 3.04 cubic metres per second (m^3/s) and up to 33 megalitres (ML) per high tide. The Proposed Development may utilise the existing cooling water abstraction and discharge infrastructure or may require additional/ new abstraction and discharge infrastructure. The Water Connection Corridor shown on **Figure 3-2 (PEIR Volume III)** covers the maximum area external to the Main Site within which the construction and operation of existing and potentially new cooling water	**In** Dee (N.Wales) GB 531106708200 **Out** Dee Carboniferous Coal Measures GB 41102G204800	It is understood that the minimum works required within the Water Connection Corridor is replacement of existing slotted band eel screens with 2 mm wide slotted screens and additional or larger intakes to account for these new screens. In the event of replacement or refurbishment of the existing intake of the cooling water infrastructure, it is assumed that new 2 mm wide slotted eel screens will be installed as part of these works. This may be required for compliance with the Eels Regulations (Ref 14). For the purposes of this WFD screening assessment, and to be precautionary, it is assumed that there will be new intake and outfall structures required. During construction, there may be impacts on surface watercourses due to the deposition of soils, sediment, oils, fuels or other construction chemicals. During operation there is potential for scour and change in hydrological regimes from discharge of cooling water from outfall into estuary. There is also potential for sediments to be mobilized as a result of the operation of the intake and outfall structures. Therefore, there is the potential for impacts on the water quality and hydromorphology quality elements of affected watercourses. Any abstraction and or cooling water discharge required as part of the Proposed Development will not exceed the existing discharge limits set by NRW. At this stage the discharge of used cooling water from the Proposed Development is unlikely to cause deterioration as it is proposed that this will not be materially different to the current cooling water discharges from the existing power station. However, the influence of future climate change (including warming sea water) will need to be considered. It is also noted that the Dee Estuary Transitional and Coastal (TRaC) water body is currently at Moderate Ecological Status due to Moderate Polycyclic Hydrocarbons (PAHs) and Bromodiphenyl ether (BDPE) concentrations, and thus it will be important to consider whether the future operation of the Proposed Development might contribute to preventing the improvement of the water body overall in the future. The risk from discharges of cooling or process water will need to be

Activity	Description	Screening Outcome	Justification
	infrastructure may be required and will be further refined as the design and EIA studies progress. Installation of a cofferdam may be required during the construction phase of the Proposed Development, to provide a safe, dry and stable working area for cleaning of existing structures, to inform the detailed design of works required to upgrade or reconstruct the existing infrastructure, and for any construction/ upgrade works. In the event of a cofferdam being required, a temporary alternative abstraction and outfall may be required.		considered further as the scheme's design progresses, and the need for water quality modelling has not yet been ruled out. If a cofferdam is required this would likely have hydromorphological impacts and therefore this element is screened in for further assessment. There is the potential for scour of the riverbed / estuary bed around the cofferdam and disruption to existing sediment transport and deposition patterns caused by the presence of the cofferdam within the waterway. This may also have an impact on sensitive habitat (saltmarsh) within the estuary and on water quality.
Upgrade of Alternative Access tracks	Light goods vehicles (LGV) and cars may access the Main Site via the proposed Alternative Access to Main Site and Access to C&IEA located to the south-east of the Main Site via the B159 Kelsterton Road south of the existing National Grid Electricity Transmission (NGET) 400kV Deeside Substation, as shown on **Figure 3-2 (PEIR Volume III).** These access roads may require minor upgrade works to ensure they are suitable for use	**Out** Dee (N.Wales) GB 531106708200 Dee Carboniferous Coal Measures GB 41102G204800	These access roads are not within 10 m of watercourses and therefore should not have an effect of the WFD status of the receiving WFD water body. Any works that may generate runoff or spillages during construction are anticipated to be adequately addressed through measures to be outlined in the Framework CEMP and Water Management Plan (WMP) in order to avoid adverse impacts on water quality to watercourses receiving drainage from the site.

Activity	Description	Screening Outcome	Justification
	for the operational phase of the Proposed Development.		
Electrical Connection Corridor	A new connection will be required from the Proposed Development CCGT Trains generator transformers to the existing NGET 400 kV substation via the Applicant's existing banking compound within the Main Site. This connection and the requirement for any works outside of the Main Site is yet to be finalised and is subject to confirmation by NGET.	**In** Dee (N.Wales) GB 531106708200 Dee Carboniferous Coal Measures GB 41102G204800	The new connection is still to be finalised and so for precautionary purposes, this element has been screened in for further assessment at ES stage.
Temporary AIL Work Areas	It is anticipated that AILs will be delivered to site via roads or transported by vessel to nearby ports and transferred onto abnormal load transport trailers. The works associated will require minor vegetation clearance and use as an access route.	**Out** Dee (N.Wales) GB 531106708200 Dee Carboniferous Coal Measures GB 41102G204800	The works associated with this activity will only require minor vegetation clearance that would have no effect on any water bodies.

4.2.2 In the operational phase of the Proposed Development, it is assumed that the intakes and outfalls will be kept clear either through the use of a compressed air blasting system, and if required a jet washing system which would be incorporated into the design. The air blast and jet washing activities would only take place on a falling tide to return the silt removed to the estuary sediment budget. Should these options not be sufficient to maintain clean flow through the screen, the use of retrievable screens for mechanical cleaning may be required.

4.2.3 The jet washing system will be in place to return silt to the estuary sediment budget and has the potential for small, localised, temporary disturbance to benthic habitats and species under the footprint of the Water Connection Corridor.

4.3 WFD Scoping

4.3.1 The WFD scoping stage defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors from the Proposed Development's activities. The scoping stage of the assessment for Dee Estuary is presented in **Table 6** to **Table 11.**

Table 6: Assessment of hydromorphology risk from activity

Activity	Potential Risk to Receptor (Yes/No)	Impact assessment required	Justification
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	No	No	The water body is not at high status.
Could significantly impact the hydromorphology of any water body	Yes	Yes	Potential upgrade and replacement of outfall structures may lead to local disruption of the bed substrate.
Is in a water body that is heavily modified for the same use as your activity	No	No	The water body is heavily modified for navigation, which is not the same use as activities within the Proposed Development.

Table 7: Assessment of biology (habitats) risks from activity

Activity	Potential Risk to Receptor (Yes/No)	Impact assessment required	Justification
Is the footprint of the activity 0.5 km^2 or larger?	Yes	Yes	The Main Site is proposed to be 1.07 km^2, and therefore greater than 0.5 km^2

Activity	Potential Risk to Receptor (Yes/No)	Impact assessment required	Justification
Is the footprint of the activity 1% or more of the water body's area?	Yes	Yes	The Main Site is approximately 1% of the water body area
Is the footprint of the activity within 500 m of any higher sensitivity habitat	Yes	Yes	The Main Site is within an area of saltmarsh
Is the footprint of the activity 1% or more of any lower sensitivity habitat	Yes	Yes	Approximately 3% of the Main Site is within an area of mudflats and sandflats

Table 8: Assessment of biology (fish) risks from activity

Activity	Potential Risk to Receptor (Yes/No)	Impact assessment required	Justification
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	Yes	In	Activities within the Dee Estuary may impact on fish populations.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Yes	In	Potential direct impacts on fish population from disturbance of the bed and / or release of contaminated construction site runoff from potential works to replace eel screens and outfall structure and associated cofferdam. Discharge of cooling water into the Dee Estuary is currently proposed to be consistent with the operation of the existing power station. However, if water is not sufficiently cooled it could create a thermal barrier to fish passage and have other environmental consequences on the designated coastal sites in terms of ecosystem dynamics and assemblages. The influence of future climate change and warming sea water will also need to be considered.

Activity	Potential Risk to Receptor (Yes/No)	Impact assessment required	Justification
Could cause entrainment or impingement of fish	No	Out	It is unlikely that activities would cause entrainment or impingement of fish.

Table 9: Assessment of Water Quality risks from activity

Activity	Potential risk to receptor	Impact assessment required	Justification
Consider if your activity could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Yes	Yes	Discharge of cooling water into the Dee Estuary is currently proposed to be consistent with the operation of the existing power station. However, if water is not sufficiently cooled it could create a thermal barrier to fish passage and have other environmental consequences on the designated coastal sites in terms of ecosystem dynamics and assemblages. The influence of future climate change and warming sea water will also need to be considered. Potential replacement of outfall and cofferdam construction, may increase sediment loads to watercourses, impacting on oxygen and nutrient levels.
Consider if your activity is in a water body with a phytoplankton status of moderate, poor or bad	No	No	Phytoplankton status is good
Consider if your activity is in a water body with a history of harmful algae	No	No	Is not within a water body which has a history of harmful algae
Consider if your activity uses or releases chemicals (for example through sediment disturbance or buildings works)	Yes	Yes	Potential replacement of outfall, cofferdam construction, and operation of the intake and outfall structures may disturb sediments and release chemicals into the water column.
Consider if your activity has a mixing zone (like a discharge pipeline or outfall)	No	No	Although the cooling water may contain some chemical compounds, these will be consistent with the current discharge and will comply within the existing environmental permit for the consented discharge. It is assumed that all

Activity	Potential risk to receptor	Impact assessment required	Justification
			discharges will be tankered off site. However, there may be a need to consider whether continued discharges similar to that from the current power station may be contributing to preventing improvement of the Dee Estuary, which is currently at Moderate Ecological Status due to PAHs and BDPE concentrations.

Table 10: Assessment of risk to WFD Protected Areas

Protected Area	Potential risk to receptor (Yes/No)	Impact assessment required	Justification
Special Areas of Conservation	Yes	In	The Main Site lies within 2 km of the Dee Estuary SAC and is therefore scoped in for further assessment
Special Protection Areas	Yes	In	The Main Site lies within the Dee Estuary SPA and is therefore scoped in for further assessment.
Shellfish Waters	No	Out	The Proposed Development does not interact with Shellfish Waters.
Bathing Waters	No	Out	The Proposed Development does not interact with Bathing Waters.
Nutrient Sensitive Areas	No	Out	The Proposed Development does not interact with Nutrient Sensitive areas.

Table 11: Summary of scoping outcome

Receptor	Potential risk to receptor?	Risk Issues
Hydromorphology	Yes	Potential upgrade and replacement of outfall structures may lead to local disruption of the bed substrate.
Biology: habitats	Yes	The footprint of the Main Site is larger than 0.5 km^2, is 1% of the water body's area, is within an area of saltmarsh (a higher sensitivity habitat) and is within an area of mudflats and sandflats (a lower sensitivity habitat).
Biology: fish	Yes	Potential direct impacts on fish population from disturbance of the bed and / or release of contaminated construction site runoff from potential works to replace eel screens and outfall structure and associated cofferdam. Discharge of cooling water into the Dee Estuary is currently proposed to be consistent with the operation of the existing power station. However, if water is not sufficiently cooled it could create a thermal

Receptor	Potential risk to receptor?	Risk Issues
		barrier to fish passage and have other environmental consequences on the designated coastal sites in terms of ecosystem dynamics and assemblages. The influence of future climate change and warming sea water will also need to be considered.
Water quality	Yes	Discharge of cooling water into the Dee Estuary is currently proposed to be consistent with the operation of the existing power station. However, if water is not sufficiently cooled it could create a thermal change within the water body at a local scale. The influence of future climate change and warming sea water will also need to be considered. Although the cooling water may contain some chemical compounds, these will be consistent with the current discharge and will comply within the existing environmental permit for the consented discharge. It is assumed that all discharges from the CCP will be tankered off site. However, there may be a need to consider whether continued discharges similar to that from the current power station may be contributing to preventing improvement of the Dee Estuary, which is currently at Moderate Ecological Status due to PAHs and BDPE concentrations. Potential replacement of outfall, cofferdam construction, and operation of intake and outfall structures may increase sediment loads to watercourses, impacting on oxygen and nutrient levels.
Protected areas	Yes	The Main Site lies within the Dee Estuary SPA and within 2 km of the Dee Estuary SAC.

4.3.2 **Table 12** outlines the WFD scoping assessment for the groundwater body.

Table 12: Scoping outcome for groundwater body

WFD Quality Element	Potential risk to receptor?	Risk Issues	Justification
Quantitative Elements	Yes	In	There are potential impacts from mobilising existing contamination in groundwater.
Chemical Elements	Yes	In	There are potential impacts from mobilising existing contamination in groundwater.

5. Construction Impacts and Mitigation

5.1 Potential Construction Impacts

5.1.1 There are a number of general adverse impacts to the water environment which may occur from construction activity, including:

- pollution of surface water or groundwater due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals, or through uncontrolled site run-off;
- temporary impacts on the hydromorphology of watercourses, where new crossings are required or construction of outfall structures; and
- temporary changes in flood risk from changes in surface water runoff and exacerbation of localised flooding, due to increased impermeable surfaces.

5.2 Construction Mitigation

5.2.1 The construction will take place in accordance with a CEMP, which details the measures that would be undertaken during construction to mitigate the temporary effects on the water environment.

5.2.2 The CEMP will set out good practice methods that are established and effective measures to which the development will be committed through the DCO – the detailed CEMP to be produced by the Contractor will need to be substantially in accordance with the Framework CEMP. The measures within the document will focus on managing the risk of pollution to surface waters and the groundwater environment. It will also consider the management of activities within floodplain areas (i.e., kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable).

5.2.3 The CEMP will be supported by a WMP that will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction.

5.2.4 It is anticipated that all WFD construction risks detailed above could be adequately mitigated with appropriate planning and management.

6. Conclusion

6.1.1 A WFD Screening and Scoping assessment Report is provided following guidance provided in the Clearing Waters for All guidance (Ref 6) and the Planning Inspectorate (PINS) Advice Note 18 (Ref 5). Proposed work activities that could adversely influence water bodies have been outlined and the WFD water bodies that could potentially be affected have been identified.

6.1.2 Based on the screening and scoping assessment presented in this report, it is concluded that some of the Proposed Development activities can be screened out of further WFD assessment. However, a WFD Impact Assessment is still required to review the potential impacts of the Proposed Development on the WFD water bodies and WFD elements that have been screened in for further assessment. The WFD Impact Assessment would consider the following WFD water bodies, quality elements, and potential impacts:

- Dee (N.Wales) (GB531106708200):
  - Principally Biological and Physico-Chemical elements, including but not limited to the discharge of cooling water in particular.
- Dee Carboniferous Coal Measures (GB41102G204800):
  - Principally the risk of mobilising contaminants into groundwater and connected surface water bodies.

6.1.3 This Screening and Scoping assessment is not concluding that the Proposed Development is at risk of failing to comply with WFD objectives, but that further impact assessment is needed to investigate and confirm WFD compliance in more detail. This is a common approach for developments of this type, and WFD Impact Assessment would be undertaken as the design for the Proposed Development is further developed alongside the ES and DCO application.

References

Ref 1. The Water Environment (Water Framework Directive) (England Wales) Regulations, 2017, available online at: https://www.legislation.gov.uk/uksi/2017/407/contents/made. [Accessed 9th April 2024].

Ref 2. The Environmental Permitting (England and Wales) Regulations, 2016, available online at: https://www.legislation.gov.uk/uksi/2016/1154/contents. [Accessed 9th April 2024]

Ref 3. Environment Agency, 2016. Water Framework Directive risk assessment: How to assess the risk of your activity. Available at: https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity [Accessed 9th April 2024].

Ref 4. Environment Agency (2016b). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers. Doc No. 488_10. [Accessed 1st February 2024].

Ref 5. National Infrastructure Planning (NIP), 2017. The Planning Inspectorate (2017). Advice Note eighteen: The Water Framework Directive. Available from: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-eighteen-the-water-framework-directive/nationally-significant-infrastructure-projects-advice-note-eighteen-the-water-framework-directive. [Accessed 1st February 2024].

Ref 6. Environment Agency, 2016. Clearing Waters for All. Water Framework Directive Assessment: estuarine and coastal waters. Available from: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters [Accessed 9th April 2024]

Ref 7. Water Watch Wales website, Available at: https://waterwatchwales.naturalresourceswales.gov.uk/en/ [Accessed 9th April 2024]

Ref 8. National Library of Scotland, n.d.; Side by Side, Georeferenced Maps. Available at: https://maps.nls.uk/geo/explore/side-by-side/#zoom=5.0&lat=56.00000&lon=-4.00000&layers=1&right=ESRIWorld [Accessed 18th June 2024].

Ref 9. British Geological Survey; Geoindex viewer. Available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ [Accessed 9th April 2024]

Ref 10. Cranfield Soils and Agrifood Institute website; Soilscapes Viewer. Available at: https://www.landis.org.uk/soilscapes/ [Accessed 9th April 2024]

Ref 11. Defra, Multi-Agency geographical information for the countryside (MAGIC) map. Available at: https://magic.defra.gov.uk/magicmap.aspx [Accessed 9th April 2024]

Ref 12. UK Centre for Ecology & Hydrology, National River Flow Archive website. Available at: https://nrfa.ceh.ac.uk/ [Accessed 9th April 2024]

Ref 13. Met office website, Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcmys019j [Accessed 9th April 2024]

Ref 14. The Eels (England and Wales) Regulations 2009 (SI 2009/3344). London: HMSO

Connah's Quay Low Carbon Power

Preliminary Environmental Information Report
Volume IV, Appendix 13-C: Flood Consequences Assessment

Uniper

The Planning Act 2008
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
PINS Reference: EN010166
September 2024

Delivering a better world

Prepared for:
Uniper UK Limited

Prepared by:
AECOM Limited

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1. Flood Consequences Assessment

1.1 Introduction

1.1.1 AECOM Limited (AECOM) has been commissioned by Uniper UK Ltd, (hereafter referred to as the 'Applicant') to undertake a Flood Consequences Assessment (FCA) for the development of the Connah's Quay Low Carbon Power project (the 'Proposed Development').

1.1.2 In accordance with National Policy Statement (NPS) EN-1 (Ref 1), applications for energy projects of 1 ha or greater in DAM Zone C and Zone B are to be accompanied by an FCA.

1.1.3 This FCA considers the flood risk to and from the Proposed Development from all sources (based on freely available data), potential mitigation options (where required) and associated constraints. AECOM's approach to this FCA has involved a desk-based review of publicly available information to establish the likely flooding sources and mechanisms for the site and has been prepared in accordance with the National Policy Statements (NPS) for Energy (NPS EN-1) (Ref 1), NPS EN-2 (Ref 2), NPS EN-4 (Ref 3), NPS EN-5 (Ref 4), Planning Policy Wales (PPW) (Ref 5) and the associated Technical Advice Note (TAN) 15: development and flood risk (Ref 6).

Proposed Development

1.1.4 The Proposed Development comprises the demolition of an existing Gas Turbine Plant (GTP), store buildings, and contractors' facilities on site, and the construction, operation, and maintenance of a Combined Cycle Gas Turbine (CCGT) generating plant with Carbon Capture to be located at the existing Connah's Quay Power Station, Flintshire, North Wales. The Proposed Development is expected to have a design life of approximately 30 years.

Policy Context

1.1.5 **Table 1** and **Figure 13-7** (**PEIR Volume III**) displays the Natural Resources Wales (NRW) Development Advice Map (DAM) (Ref 7) Zones designation across the permanent Proposed Development features. The Site boundary also includes temporary Abnormal Indivisible Load (AIL) routes and ports to enable construction of the Proposed Development. No development is planned along within the AIL routes and ports, they have not been considered as part of the FCA.

1.1.6 TAN 15 states that new development should be directed away from DAM Zone C and towards suitable land in Zone A, otherwise to Zone B. The DAM Zones are defined as:

- DAM Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding;
- DAM Zone B: Areas known to have been flooded in the past;
- DAM Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences; and

- DAM Zone C2: Areas of the floodplain without significant flood defence infrastructure.

Table 1: Site DAM Zone Designations

Parts of the Proposed Development	DAM Zone
The Main Site	B and C1
Repurposed CO_2 Connection Corridor	A (majority), small area to the north in B and C1
Proposed CO_2 Connection Corridor	A
Electrical Connection Corridor	B (majority), small areas in C1
Construction and Indicative Enhancement Area (C&IEA)	C1 (majority), some areas in B
Water Connection Corridor	C2

1.1.7 TAN 15 is planned to be updated and will be supported by the NRW Flood Map for Planning (Ref 8). NRW states that the Flood Map for Planning represents the best available information on flood risk, therefore the Flood Map for Planning has been used to assess flood risk in this FCA.

1.1.8 In July 2023, the NRW Flood Map for Planning was updated. **Table 2** and **Figure 13-8** (**PEIR Volume III**) displays the Flood Zones across the Proposed Development.

Table 2: Site Flood Zones

Parts of the Proposed Development	Flood Zone
The Main Site	Tidal Flood Zone 3, Fluvial Flood Zone 1
Repurposed CO_2 Connection Corridor	Fluvial Flood Zone 1 and Tidal Flood Zone 1 (majority), areas to the north in Fluvial Flood Zone 3 and Tidal Flood Zone 3
Proposed CO_2 Connection Corridor	Fluvial Flood Zone 1 and Tidal Flood Zone 1
Electrical Connection Corridor	Tidal Flood Zone 3
Construction and Indicative Enhancement Area	Tidal Flood Zone 3, Fluvial Flood Zone 1
Water Connection Corridor	Tidal Flood Zone 3, Fluvial Flood Zone 3

Aims and Objectives

1.1.9 The aim of this FCA is to consider the flood risk posed to, and arising from, the Proposed Development. In order to achieve this, the following objectives are required to be met:

- collect and review online NRW flood risk data, topographic data, scheme proposals and available planning policy documents (i.e. Strategic Flood Consequence Assessments and Preliminary Flood Consequence Assessments);
- assess and interpret available information to identify potential sources of flood risk including fluvial, tidal, groundwater, sewer, surface water, infrastructure failure and artificial sources;
- summarise how surface water will be managed at the site from the Proposed Development;
- propose recommendations for appropriate flood risk mitigation measures (where applicable); and
- produce an FCA report in accordance with NPS EN-1 and PPW to support the Preliminary Environmental Information Report (PEIR).

1.2 Site Description

Location

1.2.1 The existing Connah's Quay Power Station is located on the northern side of Connah's Quay (**Figure 13-1, PEIR Volume III**), approximately 4.5 km south-east of Flint. Historic mapping indicates that the Main Site consists of land that was previously lower-level marshland that has been reclaimed by land raising as part of the wider power station site development.

1.2.2 All elements of the Site Boundary, excluding the temporary AIL routes and ports, are located on the south bank of the River Dee, at the entry to the Dee Estuary. The A548 passes over the River Dee between The Electrical Connection Corridor and Construction and Indicative Enhancement Area (C&IEA).

1.2.3 The Repurposed CO_2 Connection Corridor extends from the Main Site rising upslope towards the Proposed CO_2 Connection Corridor.

1.2.4 The land use in the south-east of the Main Site is predominantly industrial, containing the existing Connah's Quay Power Station, with arable/grasslands surrounding the site to the west, and the River Dee to the north. The C&IEA is constrained by the River Dee to the north and east, with the remainder surrounded by built up land, with the power station to the north-west and the residential areas of Kelsterton and Golftyn to the south-west.

Local Water Features

1.2.5 The River Dee is a designated Main River and flows south-east to north-west along the Site Boundary. The river is defined as part of the Dee Estuary at this location. There is a continuous area of low-lying marshland and tidal mudflats between the Main Site, Electrical Connection Corridor and C&IEA boundaries, and the main river channel. The Water Connection Corridor extends into the main river channel including intertidal and sub-tidal areas that are below Mean High Water Spring Tide (MHWST).

1.2.6 Whilst the River Dee is the dominant water feature in the vicinity of the Site, online Ordnance Survey mapping indicates the following surface watercourses within the Site as seen on **Figure 13-1** (**PEIR Volume III**):

- Lead Brook – The Lead Brook is an ordinary watercourse that flows south to north along the western boundary of the Main Site before discharging into the River Dee. Upstream of Oakenholt, the watercourse is impounded to form a local reservoir. The Repurposed CO_2 Connection Corridor intersects the Lead Brook in a culverted section (NGR SJ 26271 71670);
- Kelsterton Brook – Kelsterton Brook is an ordinary watercourse that rises south of the Site at Mole Road and flows in a northerly direction towards the Main Site. The brook is culverted immediately upstream of Kelsterton Lane and remains culverted beneath the Main Site;
- Pentre Brook – Pentre Brook is an ordinary watercourse that rises in Flint Mountain and flows in a generally north-easterly direction. The brook flows approximately 480 m west of the Proposed CO_2 Connection Corridor, through Pentre Ffwrndan, prior to discharging to the River Dee estuary. Tributaries of Pentre Brook are crossed by the Repurposed CO_2 Connection Corridor;
- Unnamed ordinary watercourse – There is an unnamed ordinary watercourse which rises approximately 2 km to the south of the Site and flows north towards the Site. The watercourse becomes culverted as it flows beneath the A548 and beneath the existing Connah's Quay Power Station. The watercourse becomes open channel before discharging into the River Dee estuary; and
- Open water bodies – There are three ponds that have formed in shallow lined depressions to the west of the Main Site, between the Main Site and Lead Brook.

1.2.7 It is noted that the existing power station contained in the south-east of the Main Site has an extensive surface water drainage system that conveys surface water directly to the River Dee upstream of the Main Site.

Geology and Hydrogeology

1.2.8 The British Geological Survey (BGS) Geology Viewer (Ref 9) shows that the predominant bedrock geology underlying the Site is the Pennine Lower Coal Measures Formation (mudstone, siltstone and sandstone). Other bedrock geologies underlaying the Site include: Etruria Formation (mudstone, sandstone and conglomerate), Gwespyr Sandstone (sandstone and argillaceous rocks) and Pennine Lower Coal Measures Formation (sandstone).

1.2.9 The BGS Geology Viewer shows that Tidal Flat superficial deposits (clay, silt and sand) are present across the majority of the Site. Till superficial deposits are present across the Repurposed CO_2 Connection Corridor and Proposed CO_2 Connection Corridor. Glaciofluvial deposits are crossed by the Proposed CO_2 Connection Corridor.

1.2.10 The Tidal Flat and Till deposits are classified as Secondary Undifferentiated Aquifers defined as *"aquifers where it is not possible to apply either Secondary A or B definition because of the variable characteristics of the rock type".*

1.2.11 The Glaciofluvial Deposits are classified as Secondary A Aquifers defined as *"aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers".*

Topography

1.2.12 LiDAR data (Ref 10) shows that the Main Site, Electrical Connection Corridor and C&IEA are characterised by flat, low-lying coastal topography with typical ground levels of approximately 6 m – 8 m Above Ordnance Datum (AOD). The Water Connection Corridor is similar to the aforementioned elements, with the northern portion extending out into the lower marshland and River Dee channel to the north (3 m – 4 m AOD). Ground levels rise south along the Repurposed CO_2 Connection Corridor with levels reaching approximately 32 m – 40 m AOD at the Proposed CO_2 Connection Corridor.

1.3 Legislation, Planning Policy and Guidance

1.3.1 Legislation, planning policy and guidance relating to flood risk and pertinent to the Proposed Development is set out below.

Overarching National Policy Statement (NPS) for Energy (EN-1)

1.3.2 NPS EN-1 (Ref 1) sets out the Government's policy for the development of nationally significant infrastructure projects (NSIPs) which must be authorised by a Development Consent Order (DCO).

1.3.3 The objectives of this Preliminary FCA are in line with paragraph 5.8.15 of NPS EN-1.

1.3.4 Paragraph 5.8.18 of NPS EN-1 recommends that applicants should arrange pre-application discussions with the NRW, and, where relevant, other bodies such as Lead Local Flood Authorities (LLFA), Internal Drainage Boards (IDB), sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators. Discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FCA, and identify the information that will be required by the Secretary of State to reach decision on the application when it is submitted.

1.3.5 NPS EN-1 states at paragraph 5.8.6 to 5.8.8 that the "*aims of planning policy on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to steer new development to areas with the lowest risk of flooding. [5.8.7] Where new energy infrastructure is, exceptionally, necessary in flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood. [5.8.8]*

Proposals that aim to facilitate the relocation of existing energy infrastructure from unsustainable locations which are or will be at unacceptable risk of flooding, should be supported where it would result in climate-resilient infrastructure."

1.3.6 NPS EN-1 states at paragraph 5.8.9 that *"If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied as defined in https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2. The test provides a method of allowing necessary development to go ahead situations where suitable sites at lower risk of flooding are not available."*

1.3.7 NPS EN-1 states at paragraph 5.8.10 that *"The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Examples could include alternative site(s) that are subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), SSSIs and World Heritage Sites (WHS) which would not usually be considered appropriate."*

1.3.8 Paragraph 5.8.11 of NPS EN-1 states that *"Both elements of the Exception Test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that:*

- *the project would provide wider sustainability benefits to the community that outweigh flood risk; and*
- *the project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible will reduce flood risk overall."*

1.3.9 Paragraph 5.8.12 of NPS EN-1 states that "*Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques."*

1.3.10 Paragraph 5.8.29 of NPS EN-1 requires a sequential approach to be applied to the layout and design of the project with more vulnerable uses being located on parts of the site at lower probability and residual risk of flooding by using SuDS.

1.3.11 Paragraphs 5.8.41 of NPS EN-1 states that energy projects should not normally be consented within Flood Zone 3b or on land expected to fall within this zone within its predicted lifetime. However, it clarifies that where essential energy infrastructure has to be located in such areas, for operational reasons,

they should only be consented if the development will not result in a net loss of floodplain storage, and will not impede water flows.

1.3.12 Paragraph 5.8.27 of NPS EN-1 states that *"the surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect".*

1.3.13 Paragraph 5.8.28 of NPS EN-1 also states that it "*may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary through the use of a planning obligation*".

National Policy Statement for Natural Gas Electricity Generating Infrastructure EN-2

1.3.14 National Policy Statement for Natural Gas Electricity Generating Infrastructure EN-2 (Ref 2) principally concerns onshore natural gas-fired electricity generating infrastructure.

1.3.15 Paragraph 2.3.3 of NPS EN-2 explains that as natural gas generating stations are likely to be proposed for coastal or estuarine sites or inland rivers and climate change is likely to increase risks from flooding or rising sea level applicants should *"set out how the proposal would be resilient to:*

- *coastal changes, and increased risk from storm surge, coastal flooding and erosion;*
- *for inland projects, increased risk of flash flooding from surface water or rivers;*
- *effects of higher temperatures, including higher temperatures of cooling water, and*
- *increased risk of drought leading to a lack of available cooling water."*

National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines EN-4

1.3.16 National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (Ref 3) principally concerns nationally significant natural gas and oil infrastructure.

1.3.17 Paragraph 2.3.4 of NPS EN-4 explains that as climate change is likely to increase risks to some of this infrastructure, applicants should *"set out how the proposal would be resilient to:*

- *increased risk of flooding;*
- *effects of rising sea levels and increased risk of storm surge;*
- *higher temperatures;*

- *increased risk of earth movement, coastal erosion, or subsidence from*
- *increased risk of flooding and drought; and*
- *any other increased risks identified in the applicant's assessment."*

National Policy Statement for Electricity Networks Infrastructure EN-5

1.3.18 National Policy Statement for Electricity Networks Infrastructure EN-5 (NPS EN-5) (Ref 4) principally concerns high voltage transmission systems and distribution systems in addition to associated infrastructure.

1.3.19 Paragraph 2.3.2 of NPS EN-5 explains that as climate change is likely to increase risks to the resilience of electrical infrastructure it requires applicants to "*set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to:*

- *flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;*
- *the effects of wind and storms on overhead lines;*
- *higher average temperatures leading to increased transmission losses;*
- *earth movement or subsidence caused by flooding or drought (for underground cables)"*

Planning Policy Wales

1.3.20 Section 6.6 of PPW provides the current guidance for planning with respect to flood risk. PPW advocates that planning authorities should take a strategic approach to flood risk and consider the catchment as a whole by providing a preliminary representation of flood risks. It is stated that development should reduce, and must not increase, flood risk arising from fluvial and/or tidal flooding on and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.

Technical Advice Note 15

1.3.21 TAN 15 provides guidance which supplements the policy set out in PPW in relation to development and flooding. A precautionary framework is set out which advises caution in respect of new development in areas at high risk of flooding and this is used as a guide for planning decisions. The overall aim of the precautionary framework is to direct new development away from those areas that have a high risk of flooding; and development will only be justified in these areas if it meets the criteria and tests specified in this guidance.

1.3.22 The operation of the precautionary framework is governed by DAMs which consist of several zones (**Table 3**), used to trigger the appropriate planning test and definitions of vulnerable developments. The DAM zones are based on the best available information to determine when flood risk needs to be taken into consideration with future development.

Table 3: DAM Zone designations, their associated flood risk definition and use within the precautionary framework

DAM Zone	Definition	Use within the precautionary framework
A	Little or no risk of fluvial/ tidal flooding	Justification test is not applied and do not need to consider further
B	**Areas known to have flooded historically evidenced by sedimentary deposits.**	**Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% AEP) flood. No need to consider flood risks further if site levels are greater than the extreme flood level**
C	Based on Natural Resources Wales extreme flood outline (0.1% AEP)	Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA
C1	**Areas of Zone C which are developed and served by significant infrastructure, including flood defences**	**Indicates that development can take place subject to the application of the justification test, including acceptability of consequences**
C2	**Areas of Zone C without significant flood defence infrastructure**	**Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.**

1.3.23 The precautionary framework identifies the vulnerability of different land uses to flooding and classifies proposed uses accordingly as detailed in **Table 4**. This is because certain flooding consequences may not be acceptable for particular development types.

Table 4: Development Categories

Flood Zone Definition	Use within the precautionary framework
Emergency Services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood.
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants), and waste disposal sites.
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.

1.3.24 According to TAN 15, new development should be directed away from DAM Zone C and towards more suitable land in DAM Zone A, otherwise to DAM Zone B, where fluvial or tidal flooding will be less of an issue. The Proposed Development is classified as 'highly vulnerable' development as a power station. The majority of the Proposed Development is located within DAM Zone C1 and according to TAN 15, 'highly vulnerable' development is acceptable within DAM Zone C1 subject to application of the justification test, including acceptability of consequences.

Justification Test

1.3.25 The Proposed Development is located in DAM Zone C1 and because it is classified as 'highly vulnerable', the development must be determined by the planning authority to be justified in that location. According to TAN 15, the development will only be justified if it can be demonstrated that:

i. its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or,

   its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region; and,

ii. it concurs with the aims of PPW and meets the definition of previously developed land (PPW fig 2.1); and,

iii. the potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 found to be acceptable.

Local Development Plan

1.3.26 The Flintshire Local Development Plan (Ref 11) was adopted in 2023 and covers the period 2015 – 2030. The plan provides policies and guidance relating to development and use of land in Flintshire. The policies relating to flood risk are:

Policy EN14: Flood Risk

1.3.27 In order to avoid the risk of flooding, development will not be permitted:

a. in areas at risk of fluvial, pluvial, coastal and reservoir flooding, unless it can be demonstrated that the development can be justified in line with national guidance and is supported by a technical assessment that verifies that the new development is designed to alleviate the threat and consequences of flooding;

b. where it would lead to an increase in the risk of flooding on the site or elsewhere from fluvial, pluvial, coastal or increased surface water run-off from the site;

c. where it would have a detrimental effect on the integrity of existing flood risk management assets: or

d. where it would impede access to existing and proposed flood risk management assets for maintenance and emergency purposes.

PC3: Design

1.3.28 This policy details general design requirements for all new development including the requirement to incorporate *Sustainable Urban Drainage Schemes to bring about multiple benefits as an integral part of the development.*

Strategic Flood Consequence Assessment

1.3.29 Strategic Flood Consequence Assessments (SFCA) are used by Local Planning Authorities (LPAs) to support their Local Plan and assist in making planning decisions.

1.3.30 The Flintshire SFCA was published in 2018 (Ref 12) and identifies the strategic flood risks to key communities in Flintshire. The SFCA assesses the flood risk now and in the future and taking into account the predicted effects of climate change. Information, where applicable has been extracted from the SFCA to inform the risk of flooding within this SFCA, as documented in Section 1.4.

Climate Change Guidance

1.3.31 TAN 15 stipulates that it is necessary to account for the potential impacts of climate change on flood risk over the lifetime of a development. The most recent guidance on the application of climate change is the Welsh Government's "Flood Consequences Assessments: Climate change allowances" document (Ref 13).

1.3.32 The guidance document provides allowances for peak river flows in areas impacted by fluvial flooding, and for peak rainfall intensity in smaller catchments. Revised sea level rise projections based on UK Climate Projections (UKCP18) are also provided for locations at risk of coastal flooding.

Peak River Flow

1.3.33 Peak river flow allowances are provided for the three river basin districts in Wales. The allowances are based on percentage increases relative to the 1961-1990 baseline and are provided for the 10th (lower end estimate), 50th (central estimate), and 90th (upper end estimate) percentiles. The peak river flow allowances for the Dee river basin district where the Site is located are outlined in **Table 5**.

Table 5: Peak river flow allowances in the Dee river basin district

Dee	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper end estimate	20%	30%	45%
Central estimate	10%	15%	20%
Lower end estimate	5%	5%	5%

1.3.34 It is recommended that the central estimate for the 2080s should be employed within this FCA to assess the impacts of climate change on peak river flows, given the Proposed Development anticipated lifetime of 30 years with construction anticipated to begin in the 2030s. In addition, an assessment of risk should be made using the upper end estimate and information derived from this should be used to inform mitigation measures to help the long-term resilience of the development.

Sea Level Rise

1.3.35 **Table 6** sets out the estimates of cumulative sea level rise for the Flintshire local authority area to 2100 and 2120. The guidance document indicates that development proposals should be assessed against the 70th percentile as a minimum to inform design levels, whilst the 95th percentile should be utilised to inform the design of mitigation measures, access and egress routes and emergency evacuation plans. Given that the Proposed Development has a projected lifetime of 30 years, the 70th and 95th percentile sea level rise estimates to 2100 will be employed in this FCA to assess the impact of climate change on the risk of coastal flooding.

Table 6: Estimated mean sea level rise (in metres) for Flintshire local authority area by 2100 and 2120

Local Authority Area	Allowance (percentile)	Mean sea level rise (metres) by 2100 (UKCP18 baseline 1981 – 2000)	Mean sea level rise (metres) by 2120 (UKCP18 baseline 1981 – 2000)
Flintshire	70th	0.76	0.91
	95th	1.03	1.23

1.4 Assessment of Flood Risk Methodology

1.4.1 The methodology used to assess the flood risk is detailed below:

a. **Very Low**: where very little risk is identified or any theoretical risk identified is classified as very low within Local Authority SFCAs and/or NRW flood risk mapping extents, with very low probability of flooding occurring;

b. **Low**: where little risk is identified or any theoretical risk identified is classified as low within Local Authority SFCAs and/or NRW flood risk mapping extents, with low probability of flooding occurring;

c. **Medium**: where risk is identified within Local Authority SFCA and/or NRW flood risk mapping extents indicating a medium probability, but manageable flood risk with little to no mitigation required; and

d. **High**: where modelled levels within Local Authority SFCA and/or NRW flood risk mapping extents show risk to the Scheme as a high probability of flood risk and where mitigation needs to be considered and residual risks controlled.

1.5 Flood Risk – To Development

1.5.1 PPW requires that all potential sources of flooding that could affect the Proposed Development are considered. This section of the FCA assesses the flood risk posed to the site from: rivers and the sea, directly from rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, from reservoirs, canals, lakes and other artificial flood sources.

Tidal

1.5.2 Tidal sources include the sea and estuaries.

1.5.3 As discussed in Section 1.1, the NRW Flood Map for Planning (**Figure 13-8, PEIR Volume III**) shows that parts of the Site are located within areas of tidal Flood Zone 3. **Table 7** provides the definitions of NRW's tidal flood zones.

Table 7: NRW Tidal Flood Zone Definitions

Tidal Flood Zone	Definition
Flood Zone 2	Areas with 0.1% to 0.5% (1 in 1000 to 1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.
Flood Zone 3	Areas with more than 0.5% (1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.

1.5.4 Hydraulic modelling will be undertaken at the ES stage to provide further details on tidal flood risk and inform mitigation measures.

1.5.5 Based on available information, the tidal flood risk to the Site is considered to be high during construction, operation and decommissioning.

Fluvial

1.5.6 Fluvial flooding occurs when a river exceeds its capacity following sustained or intensive rainfall.

1.5.7 As discussed in Section 1.1, the NRW Flood Map for Planning (**Figure 13-8, PEIR Volume III**), the majority of the Site is in fluvial Flood Zone 1. However, part of the Water Connection Corridor and Repurposed CO_2 Connection Corridor are located within fluvial Flood Zone 3. **Table 8** provides the definitions of NRW's fluvial flood zones.

Table 8: NRW Fluvial Flood Zone Definitions

Fluvial Flood Zone	Definition
Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from rivers in a given year, including the effects of climate change

1.5.8 Hydraulic modelling will be undertaken at the ES stage to provide further details on fluvial flood risk and inform mitigation measures.

1.5.9 Based on available information, the fluvial flood risk to the Site is considered to be high during construction, operation and decommissioning.

Surface Water

1.5.10 Overland flow routes form when the infiltration capacity of the ground surface is exceeded during rainfall events and surface water runoff is generated. This is exacerbated when low permeability soils and/or geology are experienced or where there are large areas of impermeable surfacing.

1.5.11 According to the NRW Flood Map for Planning, the majority of the Site is not shown to be at risk of surface water flooding as shown in **Figure 13-9** (**PEIR Volume III**). The existing internal roadways at the Connah's Quay Power Station are shown to be located within Flood Zones 2 and 3 from surface water flooding. There are other small, isolated areas of Flood Zones 2 and 3 within the Main Site. **Table 9** provides the definitions of NRW's surface water flood zones.

Table 9: NRW Surface Water Flood Zone Definitions

Surface Water Flood Zone	Definition
Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water in a given year, including the effects of climate change.
Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from surface water in a given year, including the effects of climate change

1.5.12 Based on this information, the surface water flood risk to the Site is considered to be medium during construction, operation and decommissioning.

Groundwater

1.5.13 Groundwater flooding occurs when water levels in the ground rise above the ground surface. The geology dictates where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

1.5.14 According to the Soilscapes (Ref 14), soils at the Main Site, the C&IEA, the Electrical Connection Corridor and the onshore section of the Water Connection Corridor are indicated to be *"Loamy and clayey soils of coastal flats with naturally high groundwater".*

1.5.15 Soils at the Repurposed and Proposed CO_2 Connection Corridors are indicated to be *"Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils,"* with the exception of the north-west to north-east portion of the Repurposed CO_2 Connection Corridor which is mapped as *"Loamy and clayey soils of coastal flats with naturally high groundwater"*. *"Freely draining slightly acid loamy soils"* are also mapped immediately south-east of the Repurposed CO_2 Connection Corridor.

1.5.16 BGS's Borehole Records Viewer (Ref 15) has been examined to interrogate groundwater levels at the Site. Five available borehole records within the Site Boundary or within close proximity to the Site have been examined. **Table 10**

displays depths at which the groundwater was struck. Groundwater was struck at least 1 m below ground level (mbgl).

Table 10: BGS Borehole Records

Borehole ID	Borehole depth (m)	Groundwater struck (mbgl)
SJ27SE300	36.00	4.00
SJ27SE301	30.00	3.00
SJ27SE302	26.00	2.15
SJ27SE16	55.78	3.50
SJ27SE23	71.32	1.00

1.5.17 Groundwater monitoring will be undertaken at the ES stage and further information will be sought from the BGS Groundwater Flood Map to inform the FCA.

1.5.18 Based on the available information, the groundwater flood risk to the Site is considered to be medium during construction, operation and decommissioning.

Sewers

1.5.19 Sewer flooding can occur as a result of infrastructure failure, for example blocked sewers or failed pumping stations. It can also occur when combined sewer systems surcharge due to the volume or intensity of rainfall exceeding the capacity of the sewer, or if the system becomes blocked by debris or sediment.

1.5.20 According to the Flintshire SFCA, there have been no sewer flooding incidents at the Site from 1990 – 2016. Based on this information and as a drainage strategy is being produced for the Site which will manage surface water so that there is no increase in flood risk to the Proposed Development or third-party land, the sewer flood risk to the Site is considered to be low during construction, operation and decommissioning.

Artificial Sources

1.5.21 Artificial sources include raised channels such as canals, or storage features such as ponds and reservoirs.

1.5.22 The NRW Flood Map for Planning has been reviewed and shows a small part of the western side of the Main Site, the Water Connection Corridor and the northern part of the Repurposed CO_2 Connection Corridor to be at risk of flooding from reservoirs (**Figure 13-8, PEIR Volume III**).

1.5.23 The consequences from a reservoir failure could be severe, however, NRW note that this is a worst case prediction; reservoirs are maintained to a very high standard and are extremely unlikely to fail (Ref 16). Based on this information, the flood risk from artificial sources is considered to be low due to the low likelihood during construction, operation and decommissioning.

Flood Risk Summary

1.5.24 The flood risk to the Proposed Development is summarised in **Table 11**.

Table 11: Summary of flood risk to the Proposed Development

Flood Mechanism	Source	Flood risk to the development	Mitigation required?
Tidal	Dee Estuary	High	Yes
Fluvial	Main River / Ordinary Watercourse	High	Yes
Surface Water	Runoff from surrounding land and hard surfaces	Medium	Yes (surface water drainage strategy)
Groundwater	Rising groundwater levels in the underlying geology	Medium	Yes (dependent on results of groundwater monitoring)
Sewers	Surrounding public / private drainage systems	Low	No
Artificial Sources	Reservoirs	Low	No

1.6 Flood Risk – From Development

Surface Water Management

1.6.1 Development can lead to an increased risk of flooding by increasing surface water runoff as development often increases the area of impermeable surfaces thereby promoting rapid runoff to surface water sewers or watercourses rather than percolation into the ground. The effect can be to increase both total and peak water flows, contributing to flooding. A surface water drainage strategy will be produced at the ES stage to manage any increases in surface water runoff or volume.

Fluvial/Tidal

1.6.2 As mentioned in Section 1.7, land raising of the Proposed Development is likely which could lead to an increase in flood risk to third parties. Post-development hydraulic modelling will be undertaken at the ES stage to understand the impact of the Proposed Development on third party land and appropriate mitigation will be implemented in discussion with NRW.

1.7 Flood Risk Mitigation

Fluvial/Tidal

1.7.1 A Construction Environmental Management Plan (CEMP) will be produced to manage fluvial and tidal flood risk during the construction/decommissioning phases as part of embedded mitigation. Examples of measures which are likely to be implemented include:

- construction materials would be stored outside of the 0.5% AEP extent for areas at tidal flood risk and outside of the 1% AEP extent for areas at fluvial flood risk. If areas located within Flood Zone 3 are to be utilised for the storage of construction materials, this would be done in accordance with the applicable flood risk activity regulations, if required;
- connectivity would be maintained between the floodplain and the adjacent watercourses;
- during the construction phase, the Contractor would monitor the weather forecasts daily, and review the weekly and monthly weather forecasts each week, and plan works accordingly. For example, works in the channel of any watercourses would be avoided or halted were there to be a significant risk of high flows or flooding; and
- the construction laydown area site office and supervisor would be notified of any potential flood occurring by use of the Floodline Warning Service or equivalent service.

1.7.2 The contractor will be required to produce an Emergency Response Plan as part of the CEMP which will provide detail of the response to an impending flood and include:

- a 24-hour availability and ability to mobilise staff in the event of a flood warning;
- the removal of all plant, machinery and material capable of being mobilised in a flood for the duration of any holiday close down period where there is a forecast risk that the Site may be flooded;
- details of the evacuation and site closedown procedures;
- arrangements for removing any potentially hazard material;
- arrangements for removing any potentially hazardous material and implement more stringent protection measures;
- if water is encountered during below ground construction, suitable de-watering methods would be used. Any groundwater dewatering required in excess of the exemption thresholds would be undertaken in line with the requirements of the Environment Agency (under the Water Resources Act 1991 as amended (Ref 17)) and the Environmental Permitting Regulations (2016) (Ref 18); and
- safe egress and exits are to be maintained at all times when working in excavations. When working in excavations a banksman is to be present at all times.

1.7.3 Mitigation measures during operation will be developed during the ES stage and will be informed by the hydraulic modelling so that the Proposed Development will be safe throughout its lifetime. For example, it is likely that targeted land raising of the Proposed Development will be required as part of embedded mitigation. This will be considered further at the ES stage and informed by the hydraulic modelling results.

Groundwater

1.7.4 There may be potential for shallow groundwater across the Site, and therefore potential for groundwater ingress during construction. This will be confirmed at the ES stage once groundwater monitoring has been undertaken and appropriate mitigation implemented as part of the CEMP if required.

Surface Water Management

1.7.5 A surface water drainage network and management system will be provided for the Proposed Development that will provide adequate interception, conveyance and treatment of surface water runoff from proposed impermeable areas on the Main Site.

1.7.6 It is currently anticipated that surface water discharge rates will be restricted and on-site attenuation and treatment will be provided.

1.7.7 The new Connections are expected to be underground outside of the above-ground installations within the Main Site and Proposed CO_2 Connection Corridor, with the exception of post-based assets which are considered unlikely to affect existing surface water drainage, and following construction will be reinstated to existing conditions and will not require a surface water drainage system.

1.7.8 At this stage, the drainage strategy is still being prepared. The emerging drainage philosophy assumes that surface water runoff will be discharged to the Dee Estuary.

1.7.9 A CEMP will be produced to manage surface water during the construction phase so that there is no increase in flood risk to the Site or third-party land.

1.7.10 It is assumed that all underground infrastructure would remain in-situ during any decommissioning; however, all connection and access points will be sealed or grouted to facilitate disconnection.

1.8 Conclusions

Overview

1.8.1 This FCA has appraised the risk of flooding to and from the Site. The Proposed Development is classified as 'highly vulnerable' in line with TAN15 as it is a power station. Part of the Proposed Development is located in DAM Zone C1; 'highly vulnerable' development is considered acceptable in DAM Zone C1 subject to the justification test, including acceptability of consequences.

Flood Risk – To Development

1.8.2 The following potential sources of flooding which could affect the Proposed Development have been considered and assessed as follows:

- the flood risk due to tidal sources is considered to be high based on a review of the NRW Flood Map for Planning;

- the flood risk due to fluvial sources is considered to be high based on a review of the NRW Flood Map for Planning;
- the flood risk due to surface water is considered to be medium based on a review of the NRW Flood Map for Planning;
- the flood risk due to groundwater is considered to be medium, based on a review of the underlying geology and an assessment of borehole records;
- the flood risk due to sewers is considered to be low, due to a lack of historic sewer flooding incidents and the drainage strategy prepared for the Proposed Development will manage surface water with a view to there being no increase in flood risk to the Proposed Development; and
- the flood risk due to artificial sources is considered to be low, based on a review of the NRW Flood Map for Planning.

Flood Risk – From Development

1.8.3 A surface water drainage network and management system will be provided for the Proposed Development that will provide adequate interception, conveyance and treatment of surface water runoff from proposed impermeable areas on the Main Site. An outline surface water drainage strategy will be provided as part of the ES.

1.8.4 A Construction Environmental Management Plan (CEMP) will be produced to manage fluvial, tidal, groundwater and surface water flooding during the construction phase so that there is no increase in flood risk to the Site or third-party land.

1.8.5 If land raising is required, post-development hydraulic modelling will be undertaken at the ES stage to understand the impact of the Proposed Development on third party land and appropriate mitigation will be implemented.

Next Steps

1.8.6 This FCA will be updated for the ES and DCO submission including the results of the hydraulic modelling to inform the assessment of flood risk and mitigation measures.

References

Ref 1. Department for Energy Security and Net Zero, *Overarching National Policy Statement for energy (EN-1).* Available online: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf

Ref 2. Department for Energy Security and Net Zero, *National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2)* Available online: https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf

Ref 3. Department for Energy Security and Net Zero, *National Policy Statement for Natural Infrastructure and Gas and Oil Pipelines (EN-4)* Available online: https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf

Ref 4. Department for Energy Security and Net Zero, *National Policy Statement for Electricity Networks Infrastructure (EN-5).* Available online: https://assets.publishing.service.gov.uk/media/65a787fc640602000d3cb7c0/nps-natural-gas-electricity-generating-infrastructure-en2.pdf

Ref 5. Welsh Government, *Planning Policy Wales.* Available online: https://www.gov.wales/sites/default/files/publications/2024-02/planning-policy-wales-edition-12_1.pdf

Ref 6. Welsh Government, *Technical Advice Note 15: Development and Flood Risk.* Available online: https://www.gov.wales/sites/default/files/publications/2018-09/tan15-development-flood-risk.pdf

Ref 7. Natural Resources Wales, *Development Advice Map.* Available online: https://gisgeoext.cyfoethnaturiolcymru.gov.uk/Geocortex/Viewers/Html5Viewer_4145/index.html?viewer=FloodRisk

Ref 8. Natural Resources Wales, *Flood Map for Planning.* Available online: https://flood-map-for-planning.naturalresources.wales/

Ref 9. British Geological Survey, *Geology Viewer.* Available online: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/

Ref 10. DataMapWales, *LiDAR.* Available online: https://datamap.gov.wales/maps/lidar-viewer/view#/

Ref 11. Flintshire County Council, *Local Development Plan.* Available online: https://www.flintshire.gov.uk/en/Resident/Planning/Flintshire-Local-Development-Plan.aspx

Ref 12. JBA, *Strategic Flood Consequence Assessment Flintshire.* Available online: https://www.flintshire.gov.uk/en/PDFFiles/Planning/Evidence-Base-Documents/Natural-Built-Environment/LDP-EBD-EN1-Strategic-Flood-Consequences-Assessment-Final-Report-2018.pdf

Ref 13. Welsh Government, *Flood Consequences Assessments: Climate change allowances.* Available online: https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf

Ref 14. LandIS, *Soilscapes.* Available online: https://www.landis.org.uk/soilscapes/

Ref 15. British Geological Survey, *Borehole Records Viewer.* Available online: https://www.bgs.ac.uk/information-hub/borehole-records/

Ref 16. Natural Resources Wales, *Different types of flood risk.* Available online: https://naturalresources.wales/evidence-and-data/maps/different-types-of-flood-risk/?lang=en#:~:text=Reservoir%20flooding%20is%20extremely%20unlikely,release%20the%20water%20it%20holds.

Ref 17. UK Government, *Water Resources Act 1991.* Available online: https://www.legislation.gov.uk/ukpga/1991/57/contents

Ref 18. UK Government, *The Environmental Permitting (England and Wales) Regulations 2016.* Available online: https://www.legislation.gov.uk/uksi/2016/1154/contents