

Appendix 14.5: Watercourse Crossing Inventory

Table of Contents

1	Introduction	1
2	Hydrological Context	1
3	Legislative Context	2
4	Desk Study	4
5	Walkover Surveys	4
6	Ecological Provision	4
7	Watercourse Crossings	4
8	Infrastructure within 50m of Watercourses	5

1 Introduction

The infrastructure of the Project for Assessment will be comprised of approximately 4,884 m of existing tracks that will be upgraded and widened, 752 m of new floated tracks and 9,476 m of new excavated (cut) tracks. The track layout has been designed to avoid watercourses and use existing access tracks where possible, with a preference for crossing of smaller scale watercourses.

This appendix provides an inventory of information on each watercourse crossing including scale, dimensions, bedload, vegetation, along with the proposed type of crossing to be installed. At design phase these crossings will be sized by the appointed Principal Contractor to allow the 200-year annual probability event plus climate change flows and freeboard.

This appendix should be read in conjunction with ES **Chapter 14: Hydrology, Hydrogeology and Peat**.

2 Hydrological Context

The Assessment Boundary is located on a plateau, Hail Storm Hill which is occupied by Cowpe Moss, with spurs to the north east, Brandwood Moor, and south east, Rooley Moor. Watercourses radiate in all directions with several being steep and incised, and others on gentler slopes with some sinks and springs present. Many of the watercourse draining the Assessment Boundary are connected to various manmade reservoirs. The hydrological features are presented in **Figure 14.5: Hydrological Features** of **Chapter 14**.

The north and north-west of the Assessment Boundary drains to the River Irwell, via Cowpe Reservoir and Scout Moor Reservoir. The west and south-west of the Assessment Boundary drains to Naden Brook, via several reservoirs. Naden Brook discharges to the River Roch south of the Assessment Boundary. The east and south-east of the Assessment Boundary drains to the River Spodden via Cown Reservoir and Spring Mill Reservoir. The River Spodden discharges to the River Roch south-east of the Assessment Boundary in Rochdale. The River Roch discharges to the River Irwell 10km south-west of the Assessment Boundary and the River Irwell discharges to the River Mersey near Irlam, approximately 30km south-west of the Assessment Boundary.

Several ponds, springs, wells, issues, sinks and small watercourses have been identified within the Assessment Boundary. The watercourses generally drain towards the surrounding reservoirs that are located in close proximity to the north-west, south west and east including:

- Cragg High Level Tank, Cowpe Reservoir, and Scout Moor High Level Reservoir in the north-west;
- Naden Reservoirs and Greenbooth Reservoir in the south-west; and
- Spring Mill Reservoir and Cowm Reservoir in the east.

A small number springs are recorded beyond the Assessment Boundary and the surface waters on-site may receive some limited groundwater baseflow.

The Assessment Boundary is entirely located within the River Irwell surface water catchment with the River Spodden sub-catchment to the south-east and the Naden Brook sub-catchment to the south-west.

Topographic analysis using 1:50,000 scale Ordnance Survey (OS) mapping indicates the presence of 11 watercourses and associated tributaries within the Assessment Boundary.

A more detailed review of 1:10,000 scale OS mapping has revealed additional un-named tributaries within the Assessment Boundary, which are tributaries of the larger watercourses identified at the 1:50,000 scale. These smaller tributaries highlight the complexity of drainage patterns within the Assessment Boundary and the importance of considering all contributing watercourses in the assessment.

Furthermore, the presence of springs and the mining history at the Assessment Boundary, along with season variations in flow and groundwater level add to this complexity, influencing both surface and groundwater interactions across the area. Given these factors, it is possible that not every minor spring or drainage feature has been fully accounted for in the assessment.

This hydrological background underpins the assessment of watercourse crossings, informing the identification of key watercourses and guiding the design of infrastructure to minimise environmental impacts and ensure sustainable management of water resources.

3 Legislative Context

The water environment includes wetlands, rivers, lakes, transitional waters (estuaries), coastal waters, and groundwater. Environment Agency (EA) guidance, in relation to The Environmental Permitting (England and Wales) Regulations 2016 (as amended)¹, states that it is an offence to undertake the following activities without an appropriate permit:

- Discharges to all wetlands, surface waters, and groundwater;
- Disposal to land;
- Abstractions from all wetlands, surface waters, and groundwater;
- Impoundments (such as dams and weirs) of rivers, lakes, wetlands, and transitional waters; and
- Engineering works in or near a main river or flood defence structure.

Requirements for watercourse crossings (engineering works in or near a watercourse) are regulated under the Flood Risk Activity Permit (FRAP) system for main rivers. For ordinary watercourses, consents may be required from the relevant Lead Local Flood Authority (LLFA) and / or Internal Drainage Board (IDB).

The permitting system operates at different levels, based on the potential environmental impact of the activity:

¹ The Environmental Permitting (England and Wales) Regulations 2016 (as amended).

- Exemptions (for low-risk activities);
- Standard Rules Permits (for activities that fit pre-defined conditions); and
- Bespoke Permits (for more complex or higher-risk activities).

Minor watercourses, which do not feature on 1:50,000 scale Ordnance Survey (OS) mapping, may not require formal EA permitting for track crossings. However, these crossings have been considered within this report.

It would be the objective of the Applicant is to ensure that all activities remain within the relevant regulatory thresholds set out in the Environmental Permitting (England and Wales) Regulations 2016 (as amended) and associated EA guidance². The applicable regulatory requirements for this application are as follows:

- Exemptions – Minor works, such as small bridges with no construction on the riverbed or banks, may be exempt from permitting, provided they meet EA guidance on low-risk activities.
- Flood Risk Activity Permit (FRAP) – Required for engineering works in or near a main river or flood defence structure, including:
 - Bank reinforcement or re-profiling for erosion control
 - Operating machinery in or near a main river when carrying out permitted activities
 - Bridges or culverts that affect the riverbanks but do not involve extensive in-channel works
- Ordinary Watercourse Consents – For crossings or modifications affecting ordinary watercourses, approval must be sought from the LLFA or the IDB where applicable.
- Environmental Permit for Water Discharges – Required for discharges, such as construction site run-off, that could impact the water environment.
- Bespoke Permits – For more complex activities, including:
 - Bridges or culverts with construction on the bed and significant bank disturbance
 - Larger-scale river modifications that do not fit within standard FRAP conditions

Should activities exceed the above permitting thresholds, a Bespoke Permit application will be required. The EA will assess conservation considerations, environmental standards for waterbody morphology, and good practice as part of the determination process, considering factors such as location, water quality, and the scale of works.

A Water Discharge Permit for construction run-off will be required, in accordance with EA guidance. This application process will be undertaken pre-construction, supplementing information provided at the planning stage.

² Environment Agency (EA) Guidance on Environmental Permitting.

4 Desk Study

The desk study consisted of a review of the information regarding the Project for Assessment, principally involving an examination of the proposed track layout and the identification of watercourses marked on the OS 1:50,000 scale map which would require crossings to be constructed. Crossings of minor watercourses were also identified at OS 1:25,000 and 1:10,000 OS scale mapping. This information informed the design to minimise crossing locations of all mapped watercourses.

5 Walkover Surveys

Subsequent to the initial desk study, walkover surveys of the Assessment Boundary were conducted 6th and 7th February 2025 for the infrastructure layout, during which the crossing locations were visited to obtain specific information about each location that would inform decisions on the proposed crossing structures. Photographs and detailed field notes were taken reporting channel and valley dimensions, channel substrate and type of either the existing or proposed crossing. A hand-held GPS unit with greater than 5m accuracy was used to obtain locations. Subsequently a further visit was undertaken in March 2026 following layout adjustment to obtain information on the revised proposed crossing locations.

6 Ecological Provision

The Assessment Boundary is situated in an upland peatland environment with small, shallow watercourses that are unlikely to support fish migration or provide suitable habitat for otters. These watercourses typically exhibit low flow conditions, further reducing the likelihood of fish or mammal presence. As a result, specific design features such as ledges, dry passages, or in-channel modifications for fish and mammal passage are not required.

Nevertheless, the crossing designs will prioritise maintaining the natural hydrological and geomorphological characteristics of the watercourses to minimise disruption to downstream habitats and preserve overall ecosystem functionality.

7 Watercourse Crossings

A total of four watercourse crossings will be constructed on-site for the Project for Assessment. These are comprised:

- three watercourse crossings identified on the 1:10,000 scale OS mapping; and
- one watercourse crossing on the 1:50,000 scale.

All proposed watercourse crossings will be permanent, are listed in **Table 1** and shown on **Figure 14.5, and 14.5a to d: Hydrological Features**.

It is anticipated that several additional crossings will be required over eroded peat gullies that are not all marked as watercourses. These features are found throughout the Assessment Boundary and vary in width, depth, and the quantity of water present. Flow within these gullies is typically ephemeral and diffuse, with water spread across small ponds or channels rather than in a confined channel. The proposed crossings will address the fragmented nature of the

eroded peatland terrain, ensuring access while minimising further disturbance to the surrounding environment. Some typical examples are shown in **Table 2**.

The watercourse crossing locations have been carefully designed to cross watercourses where channel sections are straighter and narrower, avoiding meanders and areas of erosion, and at angles perpendicular to the water flow where possible. The crossing locations have also considered the best approach to and from the crossings considering the topography, gradients and valley dimensions. The crossings of the larger watercourse have been carefully positioned so that single span crossing on bedrock abutments can be used.

The number of watercourse crossings has been minimised where possible.

Watercourse crossings will be subject to appropriate EA authorisation and will be designed to allow the conveyance of a 0.5% AP (Annual Probability 200 year) flow event plus an allowance for climate change and freeboard. Additionally, mitigation will be put in place to control and attenuate runoff during all phases of the development and crossings will be regularly checked and maintained during operation. Regardless of the authorisation requirements, all watercourse crossings will be in accordance with the good practice measures provided in **Appendix 14.1 Good Practice Methods** and **ES Volume 3: Environmental Management Plan**.

8 Infrastructure within 30m of Watercourses

Although the layout has largely been designed to avoid encroachment within 30 m of surface watercourses, there are two locations where infrastructure is situated within this buffer zone. These occur at Turbine T14 and the Construction Laydown Area, where access track, turbine bases or associated hardstanding areas fall within 30 m of nearby watercourses.

An inventory of these locations, detailing the specific infrastructure involved, the watercourses affected, and relevant mitigation considerations, is presented in **Table 3** and shown on **Figure 14.5, and 14.5a to d: Hydrological Features**.

The encroachment into the 30 m buffer of the mapped watercourse at location T14 is limited in scale and is not considered significant. At T14, the water feature present is diffuse or poorly defined, with flow occurring through shallow saturation or across peat gullies rather than well-established channels. This feature does not represent a high-energy or sensitive hydrological system. The encroachment avoids direct proximity to active watercourses and primarily involve temporary hardstanding or clearance works that do not intersect the channel itself and will be reinstated post construction. Distance from the defined channel is greater than 20 m, with the remainder of works outside areas of concentrated flow.

Standard good practice construction methods, including silt fencing, buffer zones, and controlled drainage, will be employed to manage potential sediment mobilisation and avoid pollution risks, with details provided in the Construction Environmental Management Plan (CEMP).

Furthermore, the watercourse is not identified as having high baseline sensitivity regarding flow volume, water quality, or aquatic habitat. Given these considerations, alongside the application of standard mitigation and drainage practices, the encroachments are not expected to result in significant environmental effects.

The encroachment within 10 m of a 1:10,000 mapped watercourse at the construction laydown area (Blade Transfer Area) is limited in extent and is not considered significant. The feature is identified as a defined watercourse within the Site; however, the works associated with the laydown area are temporary in nature and do not involve direct interaction with the channel itself. All works are set back from the active channel, with the layout designed to avoid direct disturbance, and the area will be fully reinstated following construction.

Although the buffer distance is reduced at this location, the works remain outside the channel and areas of primary flow conveyance. Potential risks relating to sediment mobilisation and pollution will be managed through the implementation of standard good practice construction measures.

Surface water runoff from the laydown area will be appropriately managed to avoid adverse effects on the receiving watercourse, with flows controlled and attenuated to reflect existing conditions. The detailed design and management of drainage, including measures to maintain flow pathways and control discharge rates, are set out within the Drainage Strategy and Flood Risk Assessment.

Taking into account the temporary nature of the works, the absence of in-channel activity, and the implementation of embedded mitigation and drainage controls, the encroachment is not expected to result in significant environmental effects.

Table 1 Watercourse Crossing Inventory

Please refer to **Figure 14.5** for the figures within **Table 1** and overall location within the Assessment Boundary.

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC1	383530	419078	Tributary to Scout Moor High Level Reservoir 1:10,000 scale OS-mapped watercourse	Adjacent to T14 in the west of Assessment Boundary.	The topography at the chosen location is appropriate for a single span bottomless arch.	Channel dimensions: Flow is highly diffuse, with water spread across shallow puddles rather than confined to a distinct, continuous channel. At the time of the visit, the most defined portion of the channel measured approximately 0.5 m wide and 0.25 m deep. Valley dimensions: The feature is an erosional gully formed within peat, with banks reaching approximately 1 m in height. The gully spans around 15 m from bank to bank, with a gently sloping transition into the surrounding peatland. Substrate: The bed is primarily composed of bare peat, with localised deposits of silt and sand in lower-lying areas. Channel form: A broad, shallow erosional peat gully with an ill-defined channel, where flow is dispersed across multiple shallow depressions rather than a single, continuous path. Flow conditions: Gentle flow was observed at the time of the visit, occurring as diffuse surface water movement across the gully floor rather than within a well-defined channel. Anticipated level of authorisation: Standard Permit.



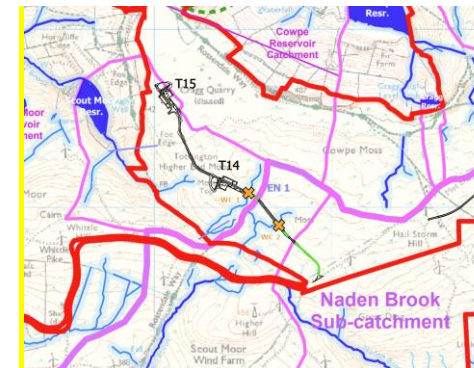
**Upstream from crossing location
WC1**



**Watercourse crossing location
WC1**

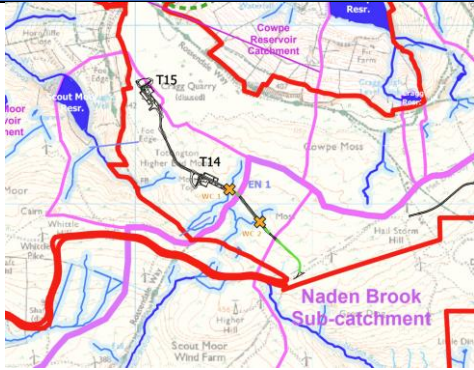


**Downstream from crossing location
WC1**



WC1 location from Figure 14.5

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC2	383709	418906	Unnamed channel that dissipates to the south 1:10,000 scale OS-mapped watercourse	Access track in west of Assessment Boundary. Located ~220m south-east of WC1.	The topography at the chosen location is appropriate for a single span bottomless arch.	Channel dimensions: At the time of the visit, the water depth was approximately 0.3 m, with flow contained within a shallow, gently sloping channel. Valley dimensions: The feature is a U-shaped erosional gully incised into peat, with banks standing around 1.8 m high. The gully spans approximately 9 m from bank to bank, with a gradual transition into surrounding peatland. Substrate: The channel bed is predominantly composed of sand, with minimal organic material or exposed peat. Some areas may include finer sediments transported during higher flows. Channel form: A broad, shallow erosional gully formed within the peat, shaped by gradual water movement. The channel lacks well-defined banks at the base, with flow spread across a gently meandering path. Flow conditions: Flow was observed to be slow and steady, with no significant turbulence or abrupt changes in water level. Water movement appeared consistent with baseflow-dominated conditions, though higher flows may occur during wetter periods. Anticipated level of authorisation: Standard Permit.

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
						
	Upstream from crossing location WC2		Watercourse crossing location WC2	Downstream from crossing location WC2		WC2 location from Figure 14.5

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC3	386012	419871	1:10,000 scale OS-mapped drain tributary of Greens Clough	Access track in north-east area of Assessment Boundary. Located ~2.5km north-east of WC2.	The topography at the chosen location is appropriate for a single span bottomless arch.	Channel dimensions: Flow is highly diffuse, with water present as shallow, squelchy saturation across vegetated ground rather than a defined channel. There is no distinct flow path, with water instead accumulating in minor depressions before gradually coalescing further downstream. At the time of the visit, the saturated area was approximately 1–2 m wide, with no measurable depth beyond surface wetness. Valley dimensions: The feature is an ill-defined shallow depression within the peat, lacking distinct banks. Any slope present is subtle, with no clear erosional features marking the edges of the watercourse. Further downstream, the feature transitions into a more developed flow path. Substrate: No distinct substrate—entirely vegetated with peatland species. The ground is saturated but intact, with no significant exposure of underlying materials such as peat, sands, or gravels. Channel form: No defined channel at this location—water movement occurs as overland flow through saturated vegetation. Further downstream, this transitions into a more recognisable watercourse. Flow conditions: Extremely limited flow observed, occurring as shallow seepage through vegetation rather than any visible movement of water. The water is fully integrated with the surrounding saturated ground, with no concentrated flow paths present. Anticipated level of authorisation: Exemption/Standard Permit.



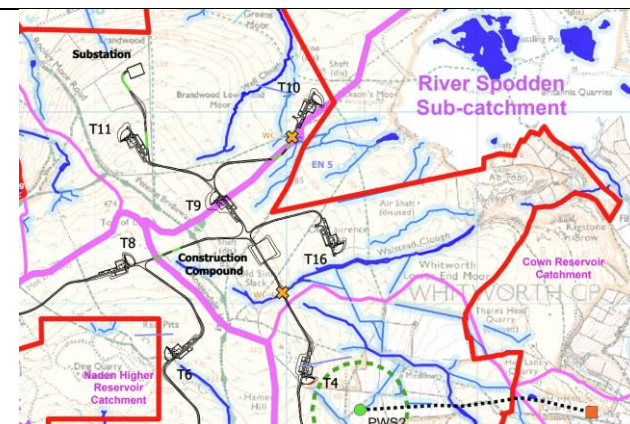
**Upstream from crossing location
WC3**



**Watercourse crossing location
WC3**



**Downstream from crossing location
WC3**



WC3 location from Figure 14.5

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC4	385971	419046	Walstead Clough 1:50,000 scale OS-mapped watercourse	Access track in central area of Assessment Boundary, west of T16.	The topography at the chosen location is appropriate for a single span bottomless arch.	Channel dimensions: The watercourse is a meandering feature with a gently to moderately sloping gradient. At the point of crossing, the valley is approximately 4 m wide, with a steeper section transitioning into a broader, gentler-sloped area where the track crosses. The main channel is well-defined in this location, measuring approximately 1 m wide and 0.5 m deep, while an additional, less distinct flow path extends to around 0.5 m wide. Valley dimensions: The valley is incised into weathered bedrock, with an overall gradient of approximately 8 m. The track crosses at a broader section where the valley widens and the slopes become more gradual. Substrate: The channel bed consists of weathered bedrock, with sands and gravels deposited in lower-energy areas. Peat and organic material are present along the banks and in less active flow zones. Channel form: A meandering watercourse transitioning through different sections of slope and confinement. At the crossing point, the channel is more incised, forming a distinct, narrow flow path, whereas upstream and downstream, it exhibits a more dispersed and dynamic morphology. Flow conditions: Moderate flow observed at the time of the visit, with water moving through both the defined channel and adjacent low-lying areas. Flow is influenced by variations in gradient and substrate composition. Anticipated level of authorisation: Standard Permit

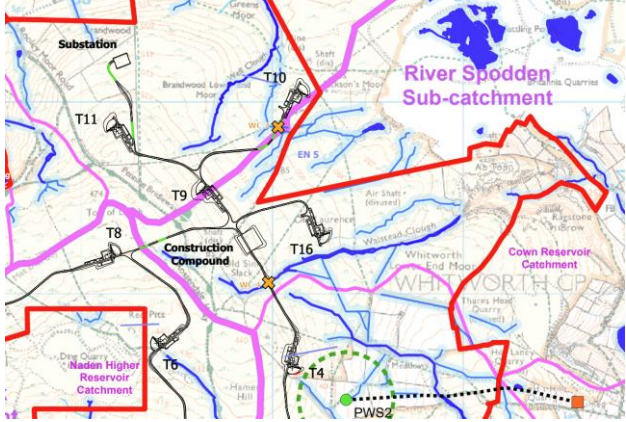
ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
						
	Upstream from crossing location WC4		Watercourse crossing location WC4	Downstream from crossing location WC4		WC4 location from Figure 14.5

Table 2 Examples of Erosional Peat Gulleys (Not shown on 1:50,000, 1:25,000 or 1:10,000 Scale OS Maps)

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
Examples of erosional peat gulley that are not mapped.	Various	Various	N/A	Various across the Assessment Boundary.	The topography at the chosen location is appropriate for a single span bottomless arch.	Various dimensions. Substrate: mostly peat or vegetation.

Erosional Peat Gulleys



ID	Infrastructure	Grid Reference		Water feature name	Distance to water feature	Area/length of encroachment	Description
		Easting	Northing				
EN1	Temporary hardstanding and clearance at Turbine 14	383492	419093	Unnamed watercourse shown on 1:25k OS mapping.	>15 m	480 m ² of temporary infrastructure	Temporary hardstanding and clearance encroach within 50 m of a mapped 1:25k watercourse. The feature comprises a broad, shallow erosional gully within peat, with a weakly defined channel. At the time of the site visit, flow was highly diffuse, occurring through shallow puddles and depressions rather than a continuous channel. The gully spans approximately 15 m across, with 1 m high peat banks and a bed composed of bare peat, with some silt and sand. Good practice drainage and sediment control measures will be implemented during construction.
EN2	Construction Laydown Area (Blade Transfer Area)	381169	418460	New Gate Brook	~15m	9264 m ² of infrastructure including earthworks footprint	Temporary hardstanding and clearance associated with the construction laydown area (Blade Transfer Area) encroach within 50 m of New Gate Brook, a mapped watercourse. New Gate Brook represents a defined drainage feature within the Site; however, no direct works are proposed within the channel or its immediate banks. The encroachment is limited in extent and relates only to temporary construction activities, with the laydown area to be fully reinstated following completion of works.