Llywodraeth Cymru
Welsh Government

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A494 River Dee Bridge Replacement Scheme
Environmental Statement
Volume 3c: Appendices
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Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 9: Appendix A

LANDMAP Aspect Area Descriptions

395318 | RML-00-XX-RP-L-9011

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9. A. LANDMAP Aspect Area Descriptions

9.1 Geological Landscape Aspect Areas

9.1.1 This section is to be read in conjunction with Figure 9.3 (395318-RML-ZZ-XX-DR-L-9003).

Table 9-1 FLNT-GL-292

Dee Canal		
Classification: Coastal / Estuary / Artificial channel/canal		
Condition: Poor	**Value:** Low	**Rarity/Uniqueness:** Low
Overall Evaluation: Low Correspond to mean high water level along artificial channel or base of flood defence where saltmarsh present. Also, county boundary in east and A548 bridge in west. Artificial river channel and system.		
Summary Description: Canalised, dominantly straight, river channel with marginal flood-defence banks. Channel widens slightly where it enters into estuary system and very narrow marginal areas of saltmarsh have developed.		
Special Link: Yes Contributes to Dee estuary system, including Bagillt Saltmarsh (FLNTGL364), Dee Estuary (FLNTGL165), Flint Sands (FLNTGL509), White Sands (FLNTGL289), Talacre (FLNTGL431) and Point of Ayr (FLNTGL931).		

Table 9-2 FLNT-GL-663

Queensferry-Mostyn Quay		
Classification: Man-made / Engineered features and reclaimed/infilled land		
Condition: Poor	**Value:** Low	**Rarity/Uniqueness:** Low
Overall Evaluation: Low Boundary with estuary corresponds to base of sea-defences where saltmarsh survives or mean high water mark; landward boundary is base of slope of drift blanketed coastal slopes to south. South-east boundary is limit of intensive developed land and north-west at extreme narrowing/virtual disappearance of coastal platform. Reclaimed former saltmarsh, extensively covered by made-ground and industrial development.		
Summary Description: Narrow, low and level coastal alluvial strip dominated by industrial and urban development on reclaimed former saltmarsh, including made ground. Separated from modern estuary system by sea wall/flood defence works. Also includes some fields on reclaimed areas, frequently marshy.		

Queensferry-Mostyn Quay
Special Link: Yes Deeside Industrial (FLNTGL530), Saltney (FLNTGL981) and Sealand (FLNTGL698) are reclaimed sections of the Dee estuary system.

Table 9-3 FLNT-GL-698

Sealand		
Classification: Coastal / Estuary / Reclaimed salt marsh/mud flat		
Condition: Fair	**Value:** Moderate	**Rarity/Uniqueness:** Low
Overall Evaluation: Moderate Boundary corresponds to that of county to north and east, sea wall/flood defence banks in north-west and south and roads/railways delineating Deeside Industrial Park. Reclaimed former saltmarsh system showing traces of channels.		
Summary Description: Broad flat plain with no more than local slight traces of undulation. Dominated by farmland with drainage ditches and enclosed by flood defence bank. Ploughed fields, in particular, show abundant traces of buried saltmarsh channel systems. Includes area in west, adjacent to unconstrained saltmarsh, with some surviving saltmarsh features including modified channel/creek.		
Special Link: Yes Deeside Industrial (FLNTGL530), Queensferry-Mostyn Quay (FLNTGL663), and Saltney (FLNTGL981) are reclaimed sections of the Dee estuary system.		

Table 9-4 FLNT-GL-752

Northop-Buckley-Broughton		
Classification: Lowland hills and valleys / Lowland glacial and fluvioglacial depositional terrain / Lowland till plain/field		
Condition: Good	**Value:** Moderate	**Rarity/Uniqueness:** Moderate
Overall Evaluation: Moderate Boundaries are defined by breaks of slope around positive features made by Carboniferous bedrock and major glacial sands and gravel outcrops, the top of the steep sides of incised valleys and the contact with flat lying estuarine alluvium areas to the north-east. Overall area typical of widespread glacial deposit cover of the county, although locally important sites do exist (Kinnerton potential RIGS site - type locality of Kinnerton Sandstone Formation).		
Summary Description: Extensive boulder clay blanketed terrain; stepped down towards the sea in the north-west due to the influence of buried scarps of Carboniferous sandstone units, but forming a gentle more even slope in the south-east. Scattered outcrops of Carboniferous and Permian rocks (the latter in the south-east only) locally show through the glacial cover.		

Northop-Buckley-Broughton		
Special Link: Yes Forms part of extensive glacial drift cover of eastern Flintshire, which includes Berthengam-Lloc (FLNTGL915), Calcot (FLNTGL222), Connah"s Quay-Oakenholt (FLNTGL101), Flint-Bagillt (FLNTGL869), Gronant-Helyg-Garmel (FLNTGL105), Gwysaney (FLNT435), Hawarden (FLNTGL196), Leeswood (FLNT650), Mold (FLNT630), Old Warren (FLNT487), Padeswood-Hope (FLNTGL352), Rhos Ithel (FLNT726), Rhosesmor (FLNT596), Treuddyn (FLNTGL549) and Tyddnuchaf (FLNTGL875).		

Table 9-5 FLNT-GL-981

Saltney		
Classification: Coastal / Estuary / Reclaimed salt marsh/mud flat		
Condition: Fair	**Value:** Moderate	**Rarity/Uniqueness:** Low
Overall Evaluation: Moderate Correspond to flood-defence bank to north, county boundary to south-east and break of slope at base of gently sloping glacial drift covered ground to the south. Reclaimed former saltmarsh still showing traces of saltmarsh features and with limited industrial/urban development.		
Summary Description: Broad, low, flat area representing reclaimed former saltmarsh, now dominantly agricultural land but with some industrial, etc., development. Flood bank defines edge of area and canalised Dee river. Ploughed fields commonly show traces of former saltmarsh channel systems.		
Special Link: Yes Deeside Industrial (FLNTGL530), Queensferry-Mostyn Quay (FLNTGL663), and Sealand (FLNTGL698) are reclaimed sections of the Dee estuary system.		

9.2 Landscape Habitats Aspect Areas

9.2.1 This section is to be read in conjunction with Figure 9.4 (395318-RML-ZZ-XX-DR-L-9004).

Table 9-6 FLNT-LH-016

Connah's Quay urban area		
Classification: Dry terrestrial habitats / Built up areas / Residential/Green space		
Condition: Unassessed	**Value:** High	**Connectivity/Cohesion:** Low
Overall Evaluation: High The broadleaved woodland follows the Wepre Brook down through the town to the Dee forming a very important wildlife corridor through the area. There is also plenty of amenity grassland, many mature trees and other areas of scrub within the urban area, it also supports important species such as great crested newts, giving it an overall high score.		
Summary Description: The boundary follows the edge of the urban area as defined by aerial photography and 1:10,000 scale mapping. This is a large urban area with many residential developments with gardens. There are several blocks of mown amenity grassland and some important areas of trees, scrub, woodland and the very important ponds which support great crested newts.		

Table 9-7 FLNT-LH-021

Sealand industrial area		
Classification: Dry terrestrial habitat / Built up areas / Industrial		
Condition: Unassessed	**Value:** Low	**Connectivity/Cohesion:** Low
Overall Evaluation: Low This area has the potential to support much more wildlife, including high tide roosting for estuarine birds, if the area around the industrial units was managed sympathetically. Its location by the River Dee and the presence of some native grasslands gives it a low to moderate value.		
Summary Description: The boundary of this area follows the edge of the industrial buildings and roadways. To the north and southeast and west are the large fertile fields of the midlands plans. To the south the River Dee forms a barrier and to the west the boundary follows the railway line which separates the more open industrial development encompassing many marshes and ponds which form FLNTLH023. This large mainly industrial area has areas of mown amenity grassland and some native grassland. Its location by the River Dee and the amount of land available means that there is significant opportunity to enhance the value of this aspects area with sensitive management.		

Table 9-8 FLNT-LH-023

Hawarden mosaic		
Classification: Dry terrestrial habitat / Mosaic / Mosaic		
Condition: Unassessed	**Value:** High	**Connectivity/Cohesion:** Moderate
Overall Evaluation: High Nationally significant species have been found in this area, which adds to its strategic location, next to the Dee Estuary. These, together with the presence of marshland and lagoons and the River Dee itself, which form important wildlife corridors; give this area overall a high evaluation.		
Summary Description: This aspect area is bounded on the west by the Dee Estuary SSSI, and to the south by the River Dee itself. To the east and south the boundary follows a railway line which marks a difference in land use between this less intensive industrial development with pockets of marshland and ponds to the more intensive development of FLNT-LH-021. This coastal strip consists of a number of industrial sites but also some grazed fields, grazing marsh and some important lagoon habitats. As the development is still scattered the surrounding land use allows for native species to colonise providing important wildlife corridors for wildlife to get from the estuary to other sites inland.		

Table 9-9 FLNT-LH-025

Sealand grassland		
Classification: Dry terrestrial habitat / Grassland and marsh / Improved grassland		
Condition: Unassessed	**Value:** Moderate	**Connectivity/Cohesion:** Moderate
Overall Evaluation: Moderate The habitats within the area are mainly improved grass fields and arable land. The River Dee passes through the area however its course has been canalised and therefore is less useful for wildlife. However, the ditches, ponds and semi-natural grassland do support an internationally important population of great crested newts giving a borderline moderate to high evaluation.		
Summary Description: This aspect area marks the end of the "midlands plain". It is bounded by a change in slope to the south-west and by the county boundary and urban area to the north, east and south. This very flat and fertile area is a mixture of arable and pasture fields. There are a few hedges in the area, but many ditches separate the fields. The wildlife value of the area is greatly enhanced by the presence of small ponds which support an internationally important population of great crested newts. This area could be threatened by rising sea levels and continuing intensification of agricultural activities.		

9.3 Visual and Sensory Aspect Areas

9.3.1 This section is to be read in conjunction with Figure 9.5 (395318-RML-ZZ-XX-DR-L-9005)

Table 9-10 FLNT-VS-014

Coastal slopes Mostyn to Ewloe	
Classification: Lowland / Rolling lowland / Mosaic rolling lowland	
Condition: Unassessed	**Value:** Moderate
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate Area of local landscape importance.	
Summary Description: Estuary edge and valleys - gently sloping and rolling lowland estuary edge with distinct east/west grain and mosaic of wooded linear stream valleys, traditional and improved farmland, and a linear settled and urban fringe lower edge; and an overall estuarine influence.	
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-663 (Queensferry-Mostyn Quay) and 752 (Northop-Buckley-Broughton) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) Historic Landscape: FLNT-HL-213 (Northop Hall), 456 (Connah's Quay), 538 (St Deiniol's Ash and Aston Hall) and 846 (Buckley and Ewloe) Cultural Landscape Services: FLNT-CLS-033 (Coastal slopes Flint to Ewloe), 043 (Connah's Quay, Shotton and Queensferry) and 131 (A55 and A494)	

Table 9-11 FLNT-VS-020

Connah's Quay, Shotton and Queensferry	
Classification: Development / Built Land / Urban	
Condition: Unassessed	**Value:** Low
Scenic quality: Low	**Character:** Low
Overall Evaluation: Low Very low quality visual and sensory experience.	
Summary Description: Connah's Quay coastal and estuary urban area - an extensive, often linear and interconnected urban area along the edge of the coast and estuary, with larger towns, sprawling suburban edges and large-scale heavy industry including docks.	

Connah's Quay, Shotton and Queensferry
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal), 663 (Queensferry-Mostyn Quay) and 752 (Northop-Buckley-Broughton) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 023 (Hawarden mosaic) Historic Landscape: FLNT-HL-213 (Northop Hall). 326 (Dee Estuary), 456 (Connah's Quay), 538 (St Deiniol's Ash and Aston Hall). Cultural Landscape Services: FLNT-CLS-033 (Coastal slopes Flint to Ewloe), 043 (Connah's Quay, Shotton and Queensferry), 044 (Aston Hall), 107 (Shotton farmland fringe), 124 (Connah's Quay Dee frontage), 129 (River Dee) and 131 (A55 and A494)

Table 9-12 FLNT-VS-021

Garden City and Deeside Industrial Park	
Classification: Development / Built Land / Urban	
Condition: Unassessed	**Value:** Low
Scenic quality: Low	**Character:** Low
Overall Evaluation: Low Very low quality visual and sensory experience.	
Summary Description: Garden City coastal and estuary urban area - an extensive, often linear and interconnected urban area along the edge of the coast and estuary, with larger towns, sprawling suburban edges and large-scale heavy industry including docks.	
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal) and 698 (Sealand) Landscape Habitats: FLNT-LH-021 (Seland industrial area), 023 (Hawarden mosaic) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-326 (Dee Estuary), 603 (Sealand) and 743 (Shotton Mills) Cultural Landscape Services: FLNT-CLS-045 (Garden City and Deeside Industrial Park), 046 (RAF Sealand), 047 (Garden City Sealand Road), 117 (Dee salt marsh fringes) 118/119/120 (Dee coastal levels), 129 (River Dee) and 131 (A55 and A494).	

Table 9-13 FLNT-VS-022

Mancot, Sandycroft and Pentre	
Classification: Development / Built Land / Urban	
Condition: Unassessed	**Value:** Low
Scenic quality: Low	**Character:** Low
Overall Evaluation: Low Very low quality visual and sensory experience.	

Mancot, Sandycroft and Pentre
Summary Description: Queensferry coastal and estuary urban area - an extensive, often linear and interconnected urban area along the edge of the coast and estuary, with larger towns, sprawling suburban edges and large-scale heavy industry including docks.
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal), 663 (Queensferry-Mostyn Quay), 752 (Northop-Buckley-Broughton) and 981 (Saltney). Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-326 (Dee Estuary), 354 (Hawarden), 456 (Connah's Quay), 487 (The Rakes) and 538 (St Deiniol's Ash and Aston Hall) Cultural Landscape Services: FLNT-CLS-048 (Mancot, Sandycroft and Pentre), 060 (Hawarden, Ewloe, Burntwood and Drury), 107/108 (Shotton farmland fringe), 121 (Dee coastal levels), 130 (River Dee) and 131 (A55 and A494)

Table 9-14 FLNT-VS-033

Hawarden, Ewloe, Burntwood and Drury	
Classification: Development / Built Land / Urban	
Condition: Unassessed	**Value:** Moderate
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate Typical suburban area of mediocre qualities - nothing too bad/nothing too good.	
Summary Description: Hawarden inland urban area - nucleated settlements within the farmland fringe landscape character area, which are close spaced to create a suburban landscape, with a predominance of residential buildings and public open spaces, parks and golf courses.	
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-752 (Northop-Buckley-Broughton) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-213 (Northop Hall), 354 (Hawarden), 396 (Hawarden Castle), 487 (The Rakes), 538 (St Deiniol's Ash and Aston Hall), 636 Padeswood and 846 (Buckley and Ewloe) Cultural Landscape Services: FLNT-CLS-048 (Mancot, Sandycroft and Pentre), 060 (Hawarden, Ewloe, Burntwood and Drury, 107/108 (Shotton farmland fringe), 131 (A55 and A494) and 132 (Hawarden parkland)	

Table 9-15 FLNT-VS-072

Shotton farmland fringe	
Classification: Lowland / Rolling Lowland / Mosaic Rolling Lowland	
Condition: Fair	**Value:** Moderate

Shotton farmland fringe	
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate The area has pleasing patterns including ditches although there are minor detractors. The area is in moderate condition and consistent character slightly spoilt by development. The area has a moderate sense of place defined by its field patterns and ditches. The area is fairly typical of Flintshire.	
Summary Description: Shotton Farmland Fringe - gently rolling lowland farmland with a mixture of small traditional fields, larger more improved rectilinear fields and drainage ditches. Hedges are a low-cut with occasional field trees. There are urban fringe uses including caravan sites and horse pasture which detract from the character of the area. Overall, the area appears well maintained and provides an important setting to the adjacent settlements. The A550 passes through the northern part of the area reducing its tranquillity. There are views out from the area to the aircraft factory to the south and settlement to the north.	
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-663 (Queensferry-Mostyn Quay), 752 (Northop-Buckley-Broughton) and 981 (Saltney) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-354 (Hawarden), 396 (Hawarden Castle), 456 (Connah's Quay), 487 (The Rakes), 538 (St Deiniol's Ash and Aston Hall) and 846 (Buckley and Ewloe) Cultural Landscape Services: FLNT-CLS-044 (Aston Hall), 048 (Mancot, Sandycroft and Pentre), 060 (Hawarden, Ewloe, Burntwood and Drury), 107/108 (Shotton farmland fringe), 121 (Dee coastal levels), 131 (A55 and A494) and 132 (Hawarden parkland)	

Table 9-16 FLNT-VS-075

Dee salt marsh fringes	
Classification: Lowland / Flat Lowland/Levels / Lowland Wetland	
Condition: Fair	**Value:** High
Scenic quality: High	**Character:** Outstanding
Overall Evaluation: High The saltmarsh is seminatural, wild and have panoramic views of the sea. It is in good condition with consistent character and unspoilt by intrusive development. The area has a highly distinctive coastal edge character. This type of habitat is relatively rare in Flintshire.	

Dee salt marsh fringes
Summary Description: Dee southern salt marsh - extensive area of Dee estuary salt marsh some grazed by sheep. The area is very exposed with wide attractive views of the estuary and backdrop of hills and detractive views of adjacent industry and tourism in places. The area is unsettled with limited access. Storms have resulted in saltmarsh flooding and erosion of mudflats, shingle and coastal defence materials in parts.
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal) and 663 (Queensferry-Mostyn Quay) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 023 (Hawarden mosaic) Historic Landscape: FLNT-HL-326 (Dee Estuary) and 743 (Shotton Mills) Cultural Landscape Services: FLNT-CLS-033 (Coastal slopes Flint to Ewloe), 043 (Connah's Quay, Shotton and Queensferry), 045 Garden City and Deeside Industrial Park, 117 (Dee salt marsh fringes) and 129 (River Dee)

Table 9-17 FLNT-VS-076

Dee coastal levels	
Classification: Lowland / Flat Lowland/Levels / Flat Open Lowland Farmland	
Condition: Fair	**Value:** Moderate
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate The area has pleasing rectilinear forms but there are minor detractors in urban fringe uses. The area is generally of consistent character and is productive although it is spoilt slightly by minor intrusive development. The rectilinear levels landscape is distinctive. This type of landscape is rare in Flintshire.	
Summary Description: Dee Coastal Levels - open strip of coastal and estuary levels with diverse mixture of rectilinear fertile arable and pastoral farmland drained by ditches with wetland and urban fringe uses. There are significant areas under clear/white plastic. Uses which tend to degrade the landscape include turf and soil sale. Settlement is scattered including farmsteads with glass and ribbon development in places. Hedgerows are low cut and gappy in places and there are few trees such as sycamore or beech except associated with dwellings or other uses. Roads are straight and public access is limited. Long views are possible to vertical elements such as power station chimneys and tower blocks to east.	

Dee coastal levels
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal), 663 (Queensferry-Mostyn Quay), 698 (Sealand), 752 (Northop-Buckley-Broughton) and 981 (Saltney) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area), 021 (Sealand industrial area), 023 (Hawarden mosaic) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-326 (Dee Estuary), 456 (Connah's Quay), 487 (The Rakes), 603 (Sealand) and 743 (Shotton Mills) Cultural Landscape Services: FLNT-CLS-045 (Garden City and Deeside Industrial Park), 046 (RAF Sealand), 047 (Garden City Sealand Road), 048 (Mancot, Sandycroft and Pentre), 108 (Shotton farmland fringe), 118/119/120/121 (Dee coastal levels), 129/130 (River Dee) and 131 (A55 and A494)

Table 9-18 FLNT-VS-078

Connah's Quay Dee frontage	
Classification: Lowland / Flat Lowland/Levels / Flat Open Lowland Farmland	
Condition: Fair	**Value:** Moderate
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate The area does have some pleasing elements and patterns such as the ditches and lines of trees although there are detractors surrounding it. The area is in declining condition and is beginning to be spoilt by urban fringe uses and ribbon development. This levels landscape has a distinctive character. Levels are relatively rare feature in Flintshire.	
Summary Description: Deeside levels - Open, narrow linear strip of levels alongside the Dee with mixture of predominantly pastoral farmland with horse pasture in rectilinear fields drained by ditches, and with wetland. There are urban fringe uses, scattered and linear settlement. The area forms an important series of green gaps between the Deeside settlements. Shotton lies adjacent and is highly visible and reduces the areas tranquillity. Tree-cover tends to be associated with historic rural development such as a prominent avenue of sycamores to a farmhouse.	
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal) and 663 (Queensferry-Mostyn Quay) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area) and 023 (Hawarden mosaic) Historic Landscape: FLNT-HL-326 (Dee Estuary) and 456 (Connah's Quay) Cultural Landscape Services: FLNT-CLS-043 (Connah's Quay, Shotton and Queensferry), 124 (Connah's Quay Dee frontage) and 129 (River Dee)	

Table 9-19 FLNT-VS-083

River Dee

Classification: Water / Inland Water / River	
Condition: Fair	**Value:** High
Scenic quality: Moderate	**Character:** High

Overall Evaluation: High

The river benefits from panoramic views of the surrounding levels and towards the hills although the river itself is fairly brutal in character. The area is managed in an appropriate condition and has consistent character relatively unspoilt by intrusive development. It has a highly distinctive character and a strong sense of place. The river is a rare element within Flintshire.

Summary Description:

River Dee - A dead straight, highly modified, tidal and wide stretch of river with grass embankments either side. There is access of the southern side of the river. The area is open and exposed. The water is muddy brown.

LANDMAP Aspect Areas Overlap

Geological Landscape: FLNT-GL-292 (Dee Canal), 663 (Queensferry-Mostyn Quay), 698 (Sealand) and 981 (Saltney)

Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area), 021 (Sealand industrial area), 023 (Hawarden mosaic) and 025 (Sealand grassland)

Historic Landscape: FLNT-HL-326 (Dee Estuary), 456 (Connah's Quay), 487 (The Rakes), 603 (Sealand) and 743 (Shotton Mills)

Cultural Landscape Services: FLNT-CLS-043 (Connah;s Quay, Shotton and Queensferry), 045 (Garden City and Deeside Industrial Park), 048 (Mancot, Sandycroft and Pentre), 117 (Dee salt marsh fringes), 119/120/121 (Dee coastal levels), 124 (Connah's Quay Dee frontage), 129/130 (River Dee) and 131 (A55 and A494)

Table 9-20 FLNT-VS-084

A55 and A494

Classification: Development / Developed Unbuilt Land / Road Corridor	
Condition: Fair	**Value:** Low
Scenic quality: Low	**Character:** Low

Overall Evaluation: Low

A road development of little scenic quality. The landscape treatment is well maintained generally although some gorse has encroached. The road has no distinct character. Roads of this type are common.

A55 and A494
Summary Description: The A55 (T) and A494 (T) are busy dual carriageways which link the north Wales coast to England and south Wales. The alignment is generally sinuous although there are straight stretches to the east where the landform allows. These are busy roads with substantial commercial traffic and affect the tranquillity of the adjacent areas including Halkyn Mountain and scarp slope. The embankments and cuttings consist of either rough grass or deciduous and mixed plantation which is now semimature. This helps to mitigate the visual impact of the road in places although traffic is still visible from the lower land. There is one service area on the mountain where there is little screening vegetation which has visual impact. Broad views of the coast are possible from the road and also of commercial areas.
LANDMAP Aspect Areas Overlap Geological Landscape: FLNT-GL-292 (Dee Canal), 663 (Queensferry-Mostyn Quay), 698 (Sealand) and 752 (Northop-Buckley-Broughton) Landscape Habitats: FLNT-LH-016 (Connah's Quay urban area), 021 (Sealand industrial area), 023 (Hawarden mosaic) and 025 (Sealand grassland) Historic Landscape: FLNT-HL-213 (Northop Hall), 326 (Dee Estuary), 396 (Hawarden Castle), 456 (Connah's Quay), 538 (St Deiniol's Ash and Aston Hall), 603 (Sealand), 636 (Padeswood), 743 (Shotton Mills) and 846 (Buckley and Ewloe) Cultural Landscape Services: FLNT-CLS-033 (Coastal slopes Flint to Ewloe), 043 (Connah;s Quay, Shotton and Queensferry), 044 (Aston Hall), 045 (Garden City and Deeside Industrial Park), 046 (RAF Sealand), 047 (Garden City Sealand Road), 048 (Mancot, Sandycroft and Pentre), 060 (Hawarden, Ewloe, Burntwood and Drury), 107 (Shotton farmland fringe), 118/119 (Dee coastal levels), 129/130 (River Dee), 131 (A55 and A494) and 132 (Hawarden parkland)

Table 9-21 FLNT-VS-085

Hawarden parkland	
Classification: Lowland / Rolling Lowland / Mosaic Rolling Lowland	
Condition: Good	**Value:** Moderate
Scenic quality: Moderate	**Character:** Moderate
Overall Evaluation: Moderate The area has pleasing patterns with woodland and positive views to the north-east. The area is in good condition and of consistent character unspoilt by development. The area has a moderate sense of place with visual unity of estate woodland and field pattern and character. The landscape character is typical of Flintshire.	

Hawarden parkland

Summary Description:

Hawarden parkland and farmland - An area of lowland parkland and woodland sloping north-east towards the levels with long sweeping views over lower ground. The field pattern tends to be rectilinear with low-cut hedges. This is interspersed with large blocks of mixed plantation on the higher slopes. the area has an estate/apartment character particularly to the north around Hawarden. To the east, around Broughton, the area becomes more open with an urban fringe character. Settlements tend to be large farmsteads in the rural areas and linear urban fringe developments elsewhere.

LANDMAP Aspect Areas Overlap

Geological Landscape: FLNT-GL-752 Northop-Buckley-Broughton

Landscape Habitats: FLNT-LH-016 Connah's Quay urban area) and 025 (Sealand grassland)

Historic Landscape: FLNT-HL-354 (Hawarden), 396 (Hawarden Castle), 636 (Padeswood) and 846 (Buckley and Ewloe)

Cultural Landscape Services: FLNT-CLS-060 (Hawarden, Ewloe, Burntwood and Drury), 108 (Shotton farmland fringe), 131 (A55 and A494) and 132 (Hawarden Parkland)

9.4 Historic Landscape Aspect Areas

9.4.1 This section is to be read in conjunction with Figure 9.6 (395318-RML-ZZ-XX-DR-L-9006)

Table 9-22 FLNT-HL-213

Northop Hall	
Classification: Rural environment / Agricultural / Irregular fieldscapes	
Condition: Unassessed	**Value:** High
Overall Evaluation: High Although a mixed landscape of fields and settlement in moderate condition its diverse archaeological content and consequent potential bring up its overall evaluation.	
Summary Description: Fairly level area of predominantly irregular fieldscapes with hedged boundaries north of Mold and Buckley, between a height of between 100-150 metres above sea level and probably representing piecemeal clearance and enclosure since at least the early medieval period onwards. Small areas of broadleaved and mixed woodland plantation of 20th-century date. Prehistoric settlement and land use suggested by dispersed lithic chance finds and Bronze Age burial sites. Wat's Dyke, an early medieval linear earthwork boundary, runs across the western side of the area. Modern settlement represented by scattered farmsteads of 18th-century and later date and the small, nucleated settlements of possible early medieval or medieval origin at Northop and Soughton and the 18th and 19th-century industrial settlements at New Brighton, Northop Hall and Ewloe Green. Dispersed 19th-century industrial remains including former coalmines, potteries, brickworks and limekilns. Some active stone quarries.	

Table 9-23 FLNT-HL-326

Dee Estuary	
Classification: Rural environment / Non-agricultural / Water and wetland	
Condition: Unassessed	**Value:** High
Overall Evaluation: High Although mostly a flooded tidal area with little recognised content it has considerable potential for submerged pre-Roman archaeology and environmental evidence.	
Summary Description: Water, coastal marshland and sands below mean high water preserving ancient land surfaces dating from the later prehistoric period and overlying later marine and estuarine sediments, both of high paleoenvironmental and archaeological significance.	

Table 9-24 FLNT-HL-354

Hawarden	
Classification: Built environment / Settlement / Nucleated settlement	
Condition: Unassessed	**Value:** Outstanding
Overall Evaluation: Outstanding A well-preserved example of a small town with medieval origins and post medieval expansion.	
Summary Description: Nucleated church settlement of medieval origin with later expansion, lying along a low ridge between about 50-80 metres above sea level just inland from the Dee estuary. The settlement originated as a small medieval market town associated with the medieval church and castle, which expanded as a notable estate village through its association with the estate of the Glynne family from the mid-17th century and with the Gladstone family in the 19th century as well its strategic and nodal position on an important route way along the north Wales coast and its association. 19th-century industrial remains include the site of former coal-mining shafts and former brickworks.	

Table 9-25 FLNT-HL-396

Hawarden Castle	
Classification: Built environment / Other built environment / Designed	
Condition: Unassessed	**Value:** Outstanding
Overall Evaluation: Outstanding Locally rare combination of high status medieval landscape overlain by extensive 18th and 19th century parkland and gardens with historical associations.	
Summary Description: Designed and woodland landscape including the 18th and 19th landscape parkland and picturesque gardens associated with Hawarden Castle, adjacent former parkland areas and extensive mixed woodland of 19th and 20th-century date and modern golf course. Medieval high-status settlement represented by Hawarden Castle motte and bailey, a 13th-century earthen castle and subsequent stone castle. In addition to Hawarden Castle, the 19th-century castellated mansion, modern settlement is largely confined to 19th-century Hawarden estate cottages and farms. Stone-built estate walls. The area also includes the sites of a Second World War aircraft dispersal site associated with RAF Hawarden wartime airfield and the remains of a WAAF camp, both near Park Farm.	

Table 9-26 FLNT-HL-456

Connah's Quay	
Classification: Built environment / Settlement / Non-nucleated settlement	
Condition: Unassessed	**Value:** Moderate

Connah's Quay	
Overall Evaluation: Moderate A post medieval and modern development on largely reclaimed land and in a generally poor condition but with some significant industrial remains.	
Summary Description: Extensive, low-lying modern settlement and manufacturing complexes at Connah''s Quay, Shotton and Queensferry and some straight-sided fields, on the southern side of the canalized river Dee, between a height of 0-50 metres above sea-level. The narrow strip along the Dee represents land drained and reclaimed in the post-medieval period. Connah's Quay originated as a port at the mouth of the river Dee New Cut from the 1770s, settlement having extended onto more anciently enclosed sloping ground further inland. Industrial remains include the sites of former coal mines, limekilns and factories. Buried estuarine sediments, of potential paleoenvironmental and archaeological significance survive along the coastal strip.	

Table 9-27 FLNT-HL-487

The Rakes	
Classification: Rural environment / Agricultural / Regular fieldscapes	
Condition: Unassessed	**Value:** High
Overall Evaluation: High A uniform and locally rare landscape of regular reclaimed fields with a distinctive character.	
Summary Description: Low-lying fieldscapes bordering the south side of the canalised river Dee north and west of Broughton Airfield, between 0-40 metres above sea level. Large, straight-sided fields defined by post-and-wire fences or hedges and drainage ditches and dykes. The northern and eastern parts of the aspect area are composed of land reclaimed from former salt marsh mostly after the 1780s, following the canalisation of the river Dee in 1737, though some small-scale piecemeal enclosure was taking place from the 1740s and contains buried land surfaces dating from the later prehistoric period and overlying marine and estuarine sediments, both of high paleoenvironmental and archaeological significance. Modern settlement is characterised by widely dispersed farms of later 18th and 19th-century origin. Dispersed 19th-century industrial remains including former coalmine, potteries, brickworks and limekilns. Three aircraft dispersal sites associated with the Second World War RAF Hawarden are found within this area, near Manor Hall Farm, The Beeches and Cop House Farm.	

Table 9-28 FLNT-HL-538

St Deiniol's Ash and Aston Hall	
Classification: Rural environment / Agricultural / Regular fieldscapes	
Condition: Unassessed	**Value:** High

St Deiniol's Ash and Aston Hall	
Overall Evaluation: High A small island in the extensive development of Deeside. Retains locally rare evidence of medieval strip fields - possibly belonging to Harwarden - but is not in the best of condition.	
Summary Description: Low-lying fieldscapes inland of Connah''s Quay, Shotton and Queensferry, between 10-80 metres above sea level. The predominant field types are strip-fields, mostly with hedged boundaries, probably representing the reorganisation and enclosure of former medieval open fields. Modern settlement represented by dispersed farmsteads of 18th century and later origin.	

Table 9-29 FLNT-HL-603

Sealand	
Classification: Rural environment / Agricultural / Regular fieldscapes	
Condition: Unassessed	**Value:** High
Overall Evaluation: High A large and well-ordered reclaimed area with the potential for significant archaeological recovery of buried landscape, but little above ground interest.	
Summary Description: Flat and low-lying fieldscapes on the northern side of the Dee Estuary, below 10 metres above sea level, systematically reclaimed from former salt marsh between 1749 and 1916, following the construction of the New Cut of the river Dee in 1737. The modern landscape is characterised by a series of substantial embankments enclosing a pattern of drainage dykes, straight-sided fields with boundaries marked by post-and-wire fences, hedges, and straight roads. Settlement represented by dispersed farms and by small, post-medieval nucleated settlement at Sealand. The area contains buried ancient land surfaces dating from the later prehistoric period overlain by later marine and estuarine sediments, of high paleoenvironmental and archaeological significance. Some pillboxes on the periphery of the former RAF Sealand Second World War airfield lie within this aspect area. A 1940s Prisoner of War Camp was also located near Sealand, within the aspect area.	

Table 9-30 FLNT-HL-636

Padeswood	
Classification: Rural environment / Agricultural / Irregular fieldscapes	
Condition: Unassessed	**Value:** Moderate
Overall Evaluation: Moderate A mixed fieldscape with a diverse historical content but no single or overriding focus. Its potential is slightly increased by the passage of Wat's Dyke and some post medieval gentry houses.	

Padeswood
Summary Description: Area of predominantly irregular fieldscapes south of Buckley, probably representing piecemeal clearance and enclosure of farmland since at least the early medieval period onwards, between a height of 80-100 metres above sea level. Early settlement and land use suggested by Bronze Age burial mounds and possible ceremonial sites in the western part of the aspect area. Medieval high-status settlement indicated by dispersed earthen castle sites possibly marking early manorial centres. Wat's Dyke, an early medieval linear earthwork boundary, runs across the centre of the area. Dispersed 19th-century industrial remains including the sites of former coalmines, brickworks, lead mines, smelt mills and limekilns. Small 17th-century and later parks and gardens associated with Pentrehobyn and Leeswood Hall, two high-status halls on the western side of the aspect area. The central part of the area is visually dominated at the modern Padeswood cement works. The growth of recreation in modern times is represented by the large Old Padeswood Golf Club.

Table 9-31 FLNT-HL-743

Shotton Mills	
Classification: Built environment / Settlement / Nucleated settlement	
Condition: Unassessed	**Value:** Moderate
Overall Evaluation: Moderate The extensive and largely modern reuse of this relatively recently reclaimed area limits its historic diversity and overall score.	
Summary Description: Flat and low-lying area protected by embankments on the northern side of the Dee Estuary, systematically reclaimed between 1749 and 1916. During the 20th century the area was dominated by the large Shotton Steeworks complex. The area is now predominantly used for heavy and light industrial use, including Deeside Industrial Park, which was previously the site of RAF Sealand, a Second World War airfield. Pre-industrial settlement was formerly limited to dispersed farms.	

Table 9-32 FLNT-HL-846

Buckley and Ewloe	
Classification: Built environment / Settlement / Other settlement	
Condition: Unassessed	**Value:** Moderate
Overall Evaluation: Moderate A confused and multi-layered landscape in a generally poor condition but containing numerous historical elements. The area is of key importance to the early post medieval pottery industry, although many of these areas are now masked by modern development.	

Buckley and Ewloe

Summary Description:

Modern, nucleated and dispersed settlements of Buckley, Ewloe and Mynydd Isa occupying fairly level ground between 50-150 metres above sea level, originating as late medieval and post-medieval dispersed settlements based upon the coalmining, pottery, brick and tile industries. 19th and 20th-century housing with occasional 19th-century brick-built former workshops and other industrial structures. Small areas of scrub-covered common land, semi-derelict and reclaimed land formerly used by manufacturing and extractive industries.

9.5 Cultural Landscape Services Aspect Areas

9.5.1 This section is to be read in conjunction with Figure 9.7 (395318-RML-ZZ-XX-DR-L-9007)

Table 9-33 FLNT-CLS-033

Coastal slopes Flint to Ewloe	
Classification: Lowland / Rolling lowland / Mosaic rolling lowland	
Night-time light pollution: Moderate	**Dark Sky Reserve:** No
Attractive views: Both in and out (no answer to Q3)	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-34 FLNT-CLS-043

Connah's Quay, Shotton and Queensferry	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Mosaic of Urban and Zone B (significant disturbance)

Table 9-35 FLNT-CLS-044

Aston Hall	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-36 FLNT-CLS-045

Garden City and Deeside Industrial Park	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-37 FLNT-CLS-046

RAF Sealand	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-38 FLNT-CLS-047

Garden City Sealand Road	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-39 FLNT-CLS-048

Mancot, Sandycroft and Pentre	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-40 FLNT-CLS-060

Hawarde, Ewloe, Burntwood and Drury	
Classification: Development / Built land / Urban	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Out (no answer to Q3)	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-41 FLNT-CLS-107 and 108

Shotton farmland fringe	
Classification: Lowland / Rolling lowland / Mosaic rolling lowland	
Night-time light pollution: Slight	**Dark Sky Reserve:** No
Attractive views: Both in and out (no answer to Q3)	

Shotton farmland fringe	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-42 FLNT-CLS-117

Dee salt marsh fringes	
Classification: Lowland / Flat lowland/levels / Lowland wetland	
Night-time light pollution: Negligible	**Dark Sky Reserve:** No
Attractive views: Both in and out (no answer to Q3)	
Perceptual/Sensory: Spiritual and wild	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-43 FLNT-CLS-118, 119, 120 and 121

Dee coastal levels	
Classification: Lowland / Flat lowland levels / Flat open lowland farmland	
Night-time light pollution: Moderate	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-44 FLNT-CLS-124

Connah's Quay Dee frontage	
Classification: Lowland / Flat lowland levels / Flat open lowland farmland	
Night-time light pollution: Moderate	**Dark Sky Reserve:** No
Attractive views: Neither in nor out	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-45 FLNT-CLS-129 and 130

River Dee	
Classification: Water / Inland water / River	
Night-time light pollution: Negligible	**Dark Sky Reserve:** No
Attractive views: Out (no answer to Q3)	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-46 FLNT-CLS-131

A55 and A494	
Classification: Development / Developed unbuilt land / Road corridor	
Night-time light pollution: Substantial	**Dark Sky Reserve:** No
Attractive views: Out (no answer to Q3)	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

Table 9-47 FLNT-CLS-132

Hawarden parkland	
Classification: Lowland / Rolling lowland / Mosaic rolling lowland	
Night-time light pollution: Moderate	**Dark Sky Reserve:** No
Attractive views: Both in and out (no answer to Q3)	
Perceptual/Sensory: Unassessed	**Wales Tranquil Area:** Over 75% Zone B (significant disturbance)

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Volume 3: Appendices

Chapter 9: Appendix B

CWCC Landscape Character Assessment

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9. B. Cheshire West and Chester Council Landscape Character Assessment

9.1 Landscape Type 5: Rolling Farmland

Key characteristics

9.1.1 Rolling farmland key characteristics:

a) Gently rolling and undulating topography, interspersed with streams.

b) Irregular and semi-regular small and medium fields (up to 8 ha).

c) Hedgerow boundaries.

d) Numerous waterbodies – mainly ponds created through marl pit digging.

e) Low woodland density.

f) Unimproved grasslands.

g) Medium settlement density – combined nucleated centres and dispersed farms, halls etc.

General description

9.1.2 This character type is defined by undulating topography and the associated small to medium scale enclosure into which it is divided. These areas sit between the Sandstone Ridge, Sandstone Fringe and the flatter areas of enclosure such as the Delamere Character Area and the East Lowland Plain. Land use is mainly pasture and settlement is a mix of nucleation and dispersion. There is a range of monuments from Bronze Age barrows to post medieval canal locks. Views within this type very much depend upon location and the nature of the immediate topography.

9.1.3 Issues affecting the Rolling Farmland landscape character type.

a) Changes in farming including pressure to diversify and changing patterns of and ownership. The purchase of agricultural holdings by non-farmers is becoming a significant force for change, resulting in conversion of farmhouses and farm buildings and changes in farm use.

b) Changes in farm crops such as an increase in areas under arable or fodder crops and a trend towards silage production. Possible move towards biomass crops such as miscanthus.

c) On-going decline in traditional woodland management practices leading to under management of farm woodlands, coverts and copses leading to general deterioration. Many hedgerow trees over-mature and in decline.

d) Reduction, fragmentation and deterioration of habitats due to loss of ponds through drainage and in-fill plus nutrient run-off from surrounding farmland. Decline in species-rich hedgerows at some locations. Intensification of grassland management leading to loss of species-rich acid grassland.

e) Loss of historic field pattern due to decline in hedgerow management, with resulting increase in use of fencing.

f) Loss of historic parkland to agriculture and recreational use e.g. golf courses.

g) Increase in demand for equestrian facilities riding schools etc. including enclosed exercise areas and associated large-scale buildings.

h) Erosion of built environment character through incremental development that may lead to loss of historic buildings and vernacular character; the suburbanisation of rural properties and their curtilage; pressure for expansion of existing settlement, ribbon development and in-fill.

i) Standardisation of roads and upgrading of lanes and minor roads leading to increasingly suburban character of the countryside.

RF6: Wirral Character Area

Including Windle Hill, Puddington and Shotwick

9.1.4 This gently undulating character area is located on the Wirral, to the east of an area of Mudflats and Saltmarsh and Neston. It extends from the northern county boundary south as far as Saughall. To the east is the Capenhurst Character Area, also within the Rolling Farmland type.

9.1.5 This is a medium-scale landscape of mixed farmland with a range of field patterns and hedgerow types. Woodlands form an important feature within this landscape and dominate many localities. Where these combine with an intact and prominent hedgerow system the scale of the landscape is effectively reduced by the increased enclosure. The area north of Burton is typical of those locally verdant areas with an obvious wooded character. The topography generally falls from a central ridge that closely follows the route of the A540, sloping down towards the Dee estuary,

although there are localised areas of flatter ground. Many of the more elevated and open locations enjoy expansive views westward across the Dee estuary towards North Wales and the Clwydian Hills. There are views to the south towards the Shotton industrial area where both the Connah's Quay power station and the dramatic new Dee Bridge are visible.

9.1.6 The close proximity of a number of large urban areas, including Neston to the north, Burton in the central area and Saughall to the south, has a significant influence upon landscape character. The urban influence is further reinforced where a number of busy highways such as the A540 to Liverpool and the A550 and A5117 dissect the area. These are particularly intrusive within the landscape at major junctions due to associated commercial development such as petrol stations, car showrooms etc. Two visually dominant overhead power lines traverse the centre of the area.

9.1.7 Settlement is more nucleated than is typical of most of Cheshire. Villages include Willaston and the smaller and picturesque Burton and Puddington. There are a small number of old houses including Shotwick Hall (II*) and Puddington Hall (II). Building materials are commonly brick and in the areas of modern housing expansion this takes the form of a range of colours and textures. There are also occasional red sandstone vernacular domestic buildings and boundaries.

9.1.8 The field pattern is mainly post-medieval, either in origin or resulting from reorganisation of earlier field systems. This is mainly regular in layout and medium in scale (4- 8 ha). Where there are patches of medieval enclosure, as around Puddington, fields are smaller and semi-regular in morphology. This area was formerly included in the Royal Forest of Wirral.

9.1.9 Boundaries are predominantly hedgerows with hedgerow trees. There are also a large number of red sandstone walls. The large number of hedgerow trees and the unkempt, overgrown nature of many of these boundaries give an impression of a well wooded, verdant area.

9.1.10 There is a high level of woodland cover from conifer plantations such as the large one to the north of Burton, to mixed mature woodlands at Burton, which is managed by the National Trust and ancient broad leave woodland e.g. Shotwick Wood.

Designations

9.1.11 Ancient woodland tends to occur on the steeper slopes such as Shotwick.

9.1.12 Dale in the steep valley of Shotwick Brook and the sloping land alongside Mudhouse Lane, which is indicated by the species of moschatel, bluebell, wood sorrel and common violet. There is also a strip of ancient woodland on the escarpment of the Old River Dee, which has species rich ground flora. To the east is species rich grassland. There are also a number of small coverts e.g. Gorse Covert and Badgersrake Covert which are broadleaves and designated as SBIs.

9.1.13 The Duckery ornamental plantation contains a lake to the east of Leaswood Farm. It was created c 1915 with stands of broad leaf and conifer and there is also an open marshy area with emergent and marginal vegetation. The Wirral Country Park lies to the southwest of Willaston.

9.1.14 Sites of archaeological interest span a vast period of time and include an Iron Age promontory fort at Burton Point, Shotwick motte and bailey castle, and a heavy anti-aircraft gun-site at Puddington. There are two grade II registered parks and gardens from the English Heritage Register – Ness Botanic Gardens and Burton Manor. The Neston Cutting, which is now a disused railway has been designated as a RIG.

9.2 Landscape Type 6: West Lowland Plain

Key characteristics

9.2.1 West Lowland Plain key characteristics:

a) Flat and almost flat topography.
b) Irregular and semi-regular small and medium fields (up to 8ha) used mainly for pasture.
c) Low density dispersed settlement.
d) Low woodland cover.
e) Black poplar trees.
f) Large number of small water bodies.
g) Scattered species-rich grasslands.

General description

9.2.2 This character type dominates a large proportion of western Cheshire, and as such it has been broken down into five character areas which reflect the subtle variations that exist in the landscape. It extends from Stanlow and Helsby in the north, as far south as Threapwood at the south-westerly tip of the county.

9.2.3 This type is defined by its flat and almost flat topography enclosed by hedgerows and standard trees in small-medium enclosures that follow an irregular and semi-regular field pattern. It is differentiated from the East Cheshire Plain by the physical barrier of the Sandstone Ridge. However, in many respects there are shared characteristics and features between the East and West Lowland Plain types.

9.2.4 Woodland cover is very low, with small blocks scattered intermittently across the area. The field patterns comprise a mix of ancient enclosure and post medieval improvement, settlement is predominantly dispersed and has a low density.

9.2.5 Issues affecting the West Lowland Plain landscape character type:

a) Changes in farming including pressure to diversify and changing patterns of land ownership. The purchase of agricultural holdings by non-farmers is becoming a significant force for change, resulting in conversion of farm houses and farm buildings and changes in farm use.

b) Changes in farm crops such as an increase in areas under arable or fodder crops and a trend towards silage production. Possible move towards biomass crops such as miscanthus.

c) On-going decline in traditional woodland management practices leading to under management of farm woodlands, coverts and copses leading to general deterioration. Many hedgerow trees over-mature and in decline.

d) Reduction, fragmentation and deterioration of habitats due to loss of ponds through drainage and in-fill plus nutrient run-off from surrounding farmland. Decline in species-rich hedgerows at some locations. Intensification of grassland management leading to loss of species-rich acid grassland.

e) Loss of historic field pattern due to decline in hedgerow management, with resulting increase in use of fencing.

f) Loss of historic parkland to agriculture and recreational use e.g. golf courses.

g) Erosion of built environment character through incremental development that may lead to loss of historic buildings and vernacular character; the

suburbanisation of rural properties and their curtilage; pressure for expansion of existing settlement, ribbon development and in-fill.

h) Standardisation of roads and upgrading of lanes and minor roads leading to increasingly suburban character of the countryside.

WLP5: Guilden Sutton Character Area

Including Mollington, Backford, Mickle Trafford, Guilden Sutton, Christleton and Waverton

9.2.6 This area extends from the edge of Ellesmere Port in the north to Waverton in the south. It lies c.10-20 m AOD. Fields are a mix of medieval and post medieval, regular to irregular in pattern, of mainly small to medium scale (up to 8 ha). There are numerous mature and over mature hedgerow oaks creating a well wooded appearance without any great occurrence of woodland, apart from a few small copses typical of the type.

9.2.7 This area's physical character is heavily influenced by its proximity to Chester and Ellesmere Port and the urban fringe location. The communications network is particularly dense due to the number of major highways radiating out of Chester. This includes the M53 and M56 and their massive interchange junction, the A56 and A51 to east Cheshire, the A55, and the A41 south to Shrewsbury. Consequently, moving traffic can form a disruptive element within the landscape at many locations. Railway lines also radiate southeast and northeast from Chester. The Shropshire Union Canal traverses the area in the north. There is a background pattern of dispersed settlement but during the 20th century most settlements in the areas surrounding Chester have expanded considerably, particularly Christleton, Guilden Sutton, Mickle Trafford and Waverton. The Saighton army camp was established in the 20th century.

9.2.8 In the east and north-east of this area two dominant elements fill the skyline and are visible over a very extensive area. The first is the northern extent of the Sandstone Ridge, forming an important visual feature to the east and appearing as a wooded mass of high ground beyond the low lying and visually insignificant Gowy Valley. The second lies to the north, in the form of the massive Industrial complex

around Stanlow and Elton which dominates the skyline. In this location the visual intrusion of a number of overhead power lines is also noticeable.

9.2.9 The combination of generally flat terrain and low, closely trimmed hedgerows means that heavy traffic on the motorways, and associated signage and lighting, can be visible over an extensive area. Where the highway is raised on an embankment the visual impact is even more substantial. The motorways are traversed by a significant number of bridges, serving the relatively dense road network or providing farm access. Although the highway planting schemes are now reaching maturity the steep bridge earthworks can still intrude and appear as artificial structures within the very flat landscape.

Designations

9.2.10 This rea has a rich historic environment. The prosperous city of Chester has acted as an economic stimulus for the area since its foundation as a Roman Fort in AD 70. The site of a Roman camp has been identified at Elm Bank near Rowton.

9.2.11 The Shropshire Union Canal winds its way through the ‘Deva Spillway’ south of Backford where, at the end of the Devensian glaciation, meltwater from the Mersey drained into the Dee, leaving an obvious dry valley within the Cheshire Plain. A stretch of the Shropshire Union Canal is also designated as an SBI, as are Acres Wood and Canal Wood, both typical small, wooded copses.

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Volume 3: Technical Assessment Report

Chapter 9: Appendix C

Landscape Character Area Descriptions

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9. C. Landscape Character Area Descriptions

9.1 Landscape Character Areas

9.1.1 This section is to be read in conjunction with Figure 9.9 (395318-RML-ZZ-XX-DR-L-9009).

LCA-01: Aston, Aston Hall Agriculture

9.1.2 Located between the suburban settlements of Hawarden community to the east and Shotton community to the west. The eastern boundary is defined by the A550 Gladstone Way and the Gladstone Way suburban settlement, the southern boundary is determined by the Wrexham-Bidston railway line, and the Aston Mead suburban settlement and the western boundary is defined by the A494. The A494 and the A550 meet at Queensferry Roundabout at Clay Hill.

Table 9-1 LCA-01 Aston, Aston Hall Agriculture

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-072 Shotton farmland fringe
Historic Landscape	FLNT-HL-538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-107 Shotton farmland fringe

LCA-01 Physical characteristics

Landform, landcover and pattern
The area is flat lowland farmland. Cover is a mosaic of pastoral fields bounded by a mixture of clipped hedges with trees, fences and ditches. Settlement consists of scattered rural dwellings connected by narrow lanes, farm tracks and footpaths. Trees are more prevalent along the old lanes and paths.

LCA-01 Perceptual characteristics

Scale and appearance
Fields are a mixture of small traditional irregularly shaped and larger improved rectilinear shaped. The field boundaries and neighbouring settlements provide an enclosed character. The area itself provides attractive inward views from neighbouring residential areas, but outward views of developed areas and transport corridors are detractive.

Tranquillity
Traffic using the transport corridors provides a constant background noise and there is frequent human access for recreation and travel between neighbouring communities.
Night-time changes
Light sources from within derive from the scattered dwellings and small farms but light pollution is influenced by neighbouring developed areas, in particular Queensferry town centre.

LCA-01 Historic and cultural designations

The field patterns have remained largely unchanged throughout the twentieth century, although some boundaries have been removed to consolidate fields. Ashfield Farm is located on the site of a former brick works served by the Aston Hall Colliery Railway. Locally designated as Green Barrier.

LCA-01 Value and susceptibility to change

Locally designated landscape with recreational footpaths connecting communities, the landscape value is judged as Medium.
There would be no direct impact due to the Scheme, and intervisibility is limited by field boundaries and substantial vegetation surrounding Queensferry junction. It is at a near to intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of moderate scenic quality with some attractive visual elements and some detractive visual elements. The susceptibility to change is judged as Low.

LCA-01 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 01 is judged as Low.

LCA-02: Deeside Industrial Park – Shotton Steelworks Lagoons

9.1.3 Located within Deeside Industrial Park. Two areas of undeveloped land providing surface water attenuation, landscape and habitat mitigation to road infrastructure and large-scale industrial complexes of Shotton Mills. The western boundary is defined by the remains of Broken Bank, and the eastern boundary by the Wrexham-Bidston railway line at Birkenhead Junction. To the north and south, the boundaries are defined by the extent of the industrial developments and power stations.

Table 9-2 LCA-02 Deeside Industrial Park – Shotton Steelworks Lagoons

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial

LANDMAP Aspect Layer	LANDMAP Aspect Area
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-02 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed former saltmarsh and infilled land gradually developed with the twentieth century expansion of the Shotton Steel Works and Deeside Industrial Park. Landcover is now a mosaic of plantation woodland, scrub woodland, unimproved grassland, former industrial lagoons, drains and ponds. Boundaries are a mixture of banks, ditches and fences.

LCA-02 Perceptual characteristics

Scale and appearance
Large scale and enclosed character. The surrounding road and rail infrastructure are on embankment and large industrial buildings limit outward views.
Tranquillity
Access to lagoons is infrequent but there is frequent access through the area and within neighbouring areas for occupation.
Night-time changes
Deeside Industrial Park is a significant source of light, which has a strong influence on the lagoons.

LCA-02 Historic and cultural designations

Westernmost lagoon nearest to Broken Bank is internationally designated as Ramsar Wetland and as Special Protection Area.

LCA-02 Value and susceptibility to change

This man-made landscape includes internationally important nature conservation designations, and as such is judged to have a High value.
There would be no direct impact due to the Scheme, it is at an intermediate to long distance away. The area is large scale, enclosed and deemed to be of low scenic quality. It is an artificial landscape set within large scale industry and infrastructure. The susceptibility to change is judged as Low.

LCA-02 Sensitivity

Combining high value and low susceptibility to change, the landscape sensitivity of LCA 02 is judged as Medium

LCA-03: Deeside Industrial Park – Shotwick Brook Lagoons

9.1.4 Series of surface water attenuation ponds and diversion of Shotwick Brook excavated in reclaimed land along the alignment of the National Grid power lines during the development of Deeside Industrial Park. The Tenth Avenue part of the Industrial Park is to the west, and Parkway to the east. The northern boundary is formed by the dualled A548 and the southern by Birkenhead Junction.

Table 9-3 LCA-03 Deeside Industrial Park – Shotwick Brook Lagoons

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-03 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed former saltmarsh and infilled land repurposed as a series of ponds. Shotwick Brook runs in a channel to the eastern side. The ponds are surrounded by mixed woodland and access is restricted by chain-link fences and security gates.

LCA-03 Perceptual characteristics

Scale and appearance
Medium scale and enclosed by areas of industry, the overhead power lines are the main detractor to views.
Tranquillity
Internal access restricted, but frequent human access to the peripheries of the character area.
Night-time changes
Deeside Industrial Park is a significant source of light, which has a strong influence on the ponds.

LCA-03 Historic and cultural designations

No historic, nature conservation or landscape designation. The character area provides a green corridor connecting the rolling farmland around Shotwick to Hawarden Bridge and the River Dee.

LCA-03 Value and susceptibility to change

This man-made landscape has no designations. The landscape value is judged as Low.
There would be no direct impact due to the Scheme, it is at an intermediate to long distance away. The area is medium scale, enclosed and deemed to be of low scenic quality. It is an artificial landscape set within large scale industry and infrastructure. The susceptibility to change is judged as Negligible.

LCA-03 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 03 is judged as Negligible and will be filtered out from further assessment.

LCA-04: Ewloe Sand Pits

9.1.5 Sloping ground separating Ewloe and Hawarden to the south from the Wrexham-Bidston railway line and Aston Hall to the north. The A494 forms the western boundary.

Table 9-4 LCA-04 Ewloe Sand Pits

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-196 Hawarden
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-033 Hawarden, Ewloe, Burntwood and Drury and 072 Shotton farmland fringe
Historic Landscape	FLNT-HL-538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-060 Hawarden, Ewloe, Burntwood and Drury and 107 Shotton farmland fringe

LCA-04 Physical characteristics

Landform, landcover and pattern
Lowland valley side with mosaic of woodland and pastoral farmland. Features the remains of sand and gravel pits and the Aston Hall Colliery Railway. Field patterns are defined by historic land use with woodland succeeding the sand pits and disused railway sidings. Some scattered rural businesses and dwellings. Boundaries and a mixture of clipped hedges, unmanaged hedgerows, stock-proof and security fences.

LCA-04 Perceptual characteristics

Scale and appearance
Medium scale and enclosed by built-up areas and the railway corridor. The area itself provides attractive inward views from neighbouring residential areas, but outward views of developed areas and transport corridors are detractive.
Tranquillity
Traffic using the transport corridors provides a constant background noise and there is frequent human access for occupation and recreation between neighbouring communities.
Night-time changes
In-between significant light sources at St David's Park and Queensferry town centre, the vegetation enclosing this area helps to mitigate light pollution.

LCA-04 Historic and cultural designations

Historic records of former mineral extraction features but no designation. Locally designated as green barrier.

LCA-04 Value and susceptibility to change

Locally designated landscape with recreational footpaths connecting communities and community woodland, the landscape value is judged as Medium.
There would be no direct impact due to the Scheme, and intervisibility is limited by field boundaries and substantial vegetation alongside the Wrexham-Bidston railway line. It is at an intermediate to long distance from the Scheme. The area is medium scale, enclosed and deemed to be of moderate scenic quality with some attractive visual elements and some detractive visual elements. The susceptibility to change is judged as Low.

LCA-04 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 04 is judged as Low.

LCA-05: Mancot – Pentre Agriculture

9.1.6 Located between residential, park and suburban areas of Queensferry to the north and the suburban settlements of Hawarden community to the south. The northern boundary is determined by the B5129 Chester Road and the suburban settlement of Pentre. The southern boundary is determined by the settlement of Little Mancot, and the western boundary is determined by the A550 Gladstone Way and Willow Park residential area.

Table 9-5 LCA-05 Mancot – Pentre Agriculture

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton and 981 Saltney
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Pentre-Mancot-Sandycroft and 072 Shotton farmland fringe
Historic Landscape	FLNT-HL-538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-048 Pentre-Mancot-Sandycroft and 107 Shotton farmland fringe

LCA-05 Physical characteristics

Landform, landcover and pattern
The area is flat lowland farmland. Cover is a mosaic of pastoral fields bounded by clipped hedges with trees and fences. Settlement consists of clusters associated with retail and leisure facilities, narrow lanes, a leisure tracks and a footpath.

LCA-05 Perceptual characteristics

Scale and appearance
Fields are small to medium sized and a mixture of rectilinear and irregular shape. Field boundaries, neighbouring settlements and business areas provide an enclosed character. There are some attractive inward views but outward views of developed industrial, retail and residential areas are detractive.
Tranquillity
Traffic using roads surrounding the area provides constant background noise. There is frequent human access to parts of the LCA for recreational use.
Night-time changes
Light sources within derive from clustered developments, lights from surrounding developed areas are a significant contribution to the overall night-time light visible.

LCA-05 Historic and cultural designations

Fields have been degraded by leisure and retail facilities. Site of former colliery and clay pits. No historic or nature conservation designations. Locally designated as Green Barrier.

LCA-05 Value and susceptibility to change

Locally designated landscape with recreational footpaths connecting communities and tourist attractions, the landscape value is judged as Medium
There would be no direct impact due to the Scheme, and intervisibility is limited by field boundaries and substantial vegetation surrounding Queensferry junction and buildings within Pentre Trade park. It is at a near to intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of moderate scenic quality with some attractive visual elements and some detractive visual elements. The susceptibility to change is judged as Low.

LCA-05 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 01 is judged as Low.

LCA-06: Queensferry – Dee Bank Agriculture

9.1.7 Located between the River Dee to the north-east and the Chester and Holyhead Railway to the southwest. The south-eastern boundary is defined by Station Road businesses and the north-western boundary is defined by sports grounds at Dee Bank.

Table 9-6 LCA-06 Queensferry – Dee Bank Agriculture

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-078 Connah's Quay frontage
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-124 Connah's Quay frontage

LCA-06 Physical characteristics

Landform, landcover and pattern
The area is flat lowland farmland. Cover is a mosaic of pastoral and arable fields bounded by hedges, fences, ditches and tree lined lanes. Settlement consists of clustered developments associated with farms and water treatment. Lanes provide access to buildings and connect to the Wales Coast Path.

LCA-06 Perceptual characteristics

Scale and appearance
Fields are rectilinear and of a medium scale, largely unchanged throughout the twentieth century apart from the encroachment of retail areas from Station Road. The area has an open character. There are many features of visual interest in outward views such as Hawarden Bridge, Shotton Steelworks office building, Bascule Bridge and part of the Flintshire Bridge but there are also detracting features such as electricity pylons and a pumping station with its enclosure.
Tranquillity
Railway embankments, retail buildings and flood defence earthworks provide a barrier to Queensferry, the A494 and Deeside Industrial Park, creating a relatively tranquil area. Trains create an intermittent disturbance. Human access is infrequent.
Night-time changes
The area is affected by overspill from neighbouring areas. Light source from within the LCA derives from individual buildings.

LCA-06 Historic and cultural designations

Records associated with air crash sites and garden at Old Hall Farm but no historic, nature conservation or landscape designations.

LCA-06 Value and susceptibility to change

Non-designated area, a footpath connects Queensferry town centre to the Wales Coast path along Hurlbutts Drive. The landscape value is judged as Low.
There would be no direct impact due to the Scheme, and intervisibility is limited by field boundaries and commercial buildings on Station Road. It is at a near to intermediate distance from the Scheme. The area is medium scale, open and deemed to be of low scenic quality with detractive visual elements surrounding the area. The susceptibility to change is judged as Low

LCA-06 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 06 is judged as Low.

LCA-07: River Dee Coastal Slopes – Broughton to Mancot

9.1.8 Valley side located between the B5125 Chester Road and the flat valley floor, which identified by a series of lanes and paths connecting Mancot to Broughton. Boundary is defined by the suburban settlement of Mancot to the north-west, the toe of the valley side to the north-east, industrial and residential areas of Broughton to the south-east and the B5125 to the south-west.

Table 9-7 LCA-07 River Dee Coastal Slopes – Broughton to Mancot

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-025 Sealand grassland
Visual and Sensory	FLNT-VS-072 Shotton farmland fringe
Historic Landscape	FLNT-HL-487 The Rakes and 538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-108 Shotton farmland fringe

LCA-07 Physical characteristics

Landform, landcover and pattern
Gently rolling lowland with improved rectilinear fields bounded by drainage ditches and clipped hedges and parkland trees. Settlement consists of scattered rural settlements and businesses connected by lanes and tracks. Small belts of woodland provide shelter. Civic amenity sites also present.

LCA-07 Perceptual characteristics

Scale and appearance
Large scale and open aspect. Modern settlements have encroached into former medieval open fields at Mancot and Broughton. The agricultural landscape provides an attractive setting to the suburban areas, and open views across to Sealand and Cheshire overlooking the River Dee are available to the upper parts of the slopes.
Tranquillity
Frequent access for occupation along the south-western edge and less frequent access using the lanes such as Ash Lane, Moor Lane and Rake Lane that connect the B5125 Chester Road to the B5129 Chester Road East.
Night-time changes
There is little internal light source, and the area provides a slight refuge from the brightly lit areas of Queensferry and Broughton.

LCA-07 Historic and cultural designations

St Deiniol's Ash is a Grade I listed building dating from sixteenth and seventeenth century. Small area of restored ancient woodland on the outskirts of Mancot. Locally designated as a Green Barrier.

LCA-07 Value and susceptibility to change

Locally designated area deemed to be of moderate scenic quality and character. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme, views of the A494 across Mancot and Pentre are available from the upper slopes. It is at an intermediate to long distance from the Scheme. The area is large scale, open and deemed to be of moderate scenic quality with detractive visual elements surrounding the area. The susceptibility to change is judged as Low

LCA-07 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 07 is judged as Low.

LCA-08: River Dee Flood Plain

9.1.9 Narrow strip of land located between the River Dee and the agricultural / recreational strip. The boundaries are defined by levees and earthworks. Prone to occasional flooding.

Table 9-8 LCA-08 River Dee Flood Plain

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-078 Connah's Quay Dee frontage
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-124 Connah's Quay Dee frontage

LCA-08 Physical characteristics

Landform, landcover and pattern
The area is lowland level salt marsh, occasionally grazed by livestock. Bounded by earthworks and divided by stock proof fences. There is no settlement, but the area is crossed by Hawarden Bridge and National Grid high voltage supply. The Wales Coast Path runs along the area on the flood defence earthworks.

LCA-08 Perceptual characteristics

Scale and appearance
The open area pattern is largely unchanged since the land was reclaimed after the construction of the River Dee Canal. The embankments are low and provide an open character. There are features of visual interest in Hawarden Bridge, Shotton Steelworks office buildings, Bascule Bridge, Flintshire Bridge, Connah's Quay Power Station and the River Dee but National Grid pylons and Shotton Steelworks industrial buildings are visual detractors.
Tranquillity
Trains create an intermittent disruption. There is frequent human access by cyclists and pedestrians commuting and for recreation.
Night-time changes
There are few sources of light generated within this area, the occasional lighting column along the paths. The area is influenced by overspill from neighbouring built-up areas.

LCA-08 Historic and cultural designations

Hawarden Bridge is a Grade II listed building. There are several pillboxes distributed along the earthworks embankments that are of historic interest. The saltmarsh is a valued habitat.

LCA-08 Value and susceptibility to change

Non designated landscape with listed buildings, national monuments and valued habitat. It is immediately adjacent to internationally protected sites of nature conservation. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme. Views of the Dee Bridge and road structures are available from the levees and paths but are partially interrupted by the Bascule Bridge and development along Station Road. It is at a near to intermediate distance from the Scheme. The area is medium scale, open and deemed to be of low scenic quality with detractive visual elements surrounding the area. The susceptibility to change is judged as Low

LCA-08 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 08 is judged as Low.

LCA-09: River Dee Reclaimed Agriculture - Sandycroft

9.1.10 Located between Mancot/Sandycroft to the north-west and Broughton to the south-east. The north-eastern boundary is defined by the Chester and Holyhead railway and the south-western by the transition to gently sloping valley side aligned with Moor Farm, Rake Lane Farm and Manor Farm.

Table 9-9 LCA-09 River Dee Reclaimed Agriculture - Sandycroft

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton and 981 Saltney
Landscape Habitats	FLNT-LH-025 Sealand grassland
Visual and Sensory	FLNT-VS-072 Shotton farmland fringe and 076 Dee coastal levels
Historic Landscape	FLNT-HL-487 The Rakes and 538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-108 Shotton farmland fringe and 121 Dee coastal levels

LCA-09 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed former saltmarsh. Landcover is now a mosaic of predominantly pastoral and arable fields bounded by clipped hedges with occasional hedgerow tree, ditches, drains and stock-proof fences. Some unmanaged hedgerows at edges of settlement and at roadsides. There are a few small blocks of shelter belt woodland. Settlement consists of scattered rural dwellings and businesses. Fields are small-scale and irregularly shaped at the Mancot/Sandycroft end, and large scale and regularly shaped at the Broughton end. Crossed by the B5129 Chester Road East, Moor Lane and Rake Lane.

LCA-09 Perceptual characteristics

Scale and appearance
Mixed scale, small to large scale, with generally an open aspect, but flat ground surrounded by settlement and industry restricts outward views to those of the coastal slopes and large-scale industrial buildings.
Tranquillity
Frequent access along Chester Road East between Mancot/Sandycroft and Broughton for occupation and habitation. Less frequent access along Moor Lane and Rake Lane but provide alternative connections to the B5125.
Night-time changes
Near to industrial sites and influenced by significant light-spill from Broughton and Sandycroft.

LCA-09 Historic and cultural designations

Grade II listed buildings at Plas Moor farm and Manor Farm, records of air crash site in fields south-east of Sandycroft. Locally designated as Green Barrier.

LCA-09 Value and susceptibility to change

Reclaimed landscape has listed buildings and local landscape designation. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme, it is at an intermediate to long distance away. The area is of mixed scale, open and deemed to be of moderate scenic quality. It is an agricultural landscape set within suburban settlements and large-scale industry. Intervisibility with Dee Bridge is interrupted by built-up areas. The susceptibility to change is judged as Negligible.

LCA-09 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA-09 is judged as Low.

LCA-10: River Dee Reclaimed Agriculture – Sealand

9.1.11 North-eastern boundary defined by England/Wales border and the natural line of River Dee from Shotwick to Blacon Point before canalisation. South-western boundary defined by the Sealand embankment. Marsh gradually reclaimed for agriculture from 1769 to 1892.

Table 9-10 LCA-10 River Dee Reclaimed Agriculture – Sealand

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-698 Sealand
Landscape Habitats	FLNT-LH-025 Sealand grassland
Visual and Sensory	FLNT-VS-076 Dee coastal levels
Historic Landscape	FLNT-HL-603 Sealand
Cultural Landscape Services	FLNT-CLS-119 Dee coastal levels

LCA-10 Physical characteristics

Landform, landcover and pattern
Lowland level agricultural land. Cover is a mosaic of pastoral and arable land. Settlement consists of rural dwellings and businesses distributed along roads, clusters of dwellings at road junctions and in parcels of land severed by roads or disused railways. Fields are large-scale and rectilinear, bounded by drains, clipped hedges and stock-proof fences.

LCA-10 Perceptual characteristics

Scale and appearance
Large-scale and open aspect fields drained by ditches. Flat ground limits outward views to those of large-scale industrial buildings and lines of Lombardy poplar trees and the high ground of the Clwydian Hills in the western distance.
Tranquillity
Sealand Road and Green Lane are active with frequent travel from the A494/A548/A550 into Chester and the Sealand Road retail areas. Cycle route created on the line of the disused Great Central Railway, several lanes and footpaths linking into Saughall and Shotwick.
Night-time changes
Within the core of the area light sources are limited to dwellings and rural businesses, but strong influence at north-western edge from the A494 corridor and at south-eastern edge at Sealand Road retail areas.

LCA-10 Historic and cultural designations

St Bartholomew's church and churchyard wall in the small settlement of Sealand and Old Marsh Farm are Grade II listed buildings. Bels of woodland to three sides of Old Marsh Farm categorised as ancient semi-natural woodland despite the land being reclaimed in the nineteenth century. Locally designated as Green Barrier.

LCA-10 Value and susceptibility to change

Reclaimed landscape has listed buildings and local landscape designation. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme, it is at an intermediate to long distance away. The area is large scale, open and deemed to be of moderate scenic quality. It is an agricultural landscape set between settlements. Intervisibility with Dee Bridge in limited by the flat lowland terrain. The susceptibility to change is judged as Negligible.

LCA-10 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA-10 is judged as Low.

LCA-11: River Dee Reclaimed Agriculture – Sealand Manor

9.1.12 Located between the River Dee north embankment and the Sealand embankment. Marsh reclaimed for agriculture in the 1750s and 1760s. The south-eastern boundary is defined by Ferry Lane, the access to the Higher Ferry crossing at Saltney. The north-western boundary is defined by the A494 at Garden City.

Table 9-11 LCA-11 River Dee Reclaimed Agriculture – Sealand Manor

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-698 Sealand
Landscape Habitats	FLNT-LH-025 Sealand grassland
Visual and Sensory	FLNT-VS-076 Dee coastal levels
Historic Landscape	FLNT-HL-603 Sealand
Cultural Landscape Services	FLNT-CLS-119 Dee coastal levels

LCA-11 Physical characteristics

Landform, landcover and pattern
The area is lowland level farmland. Cover is a mosaic of arable farmland, plantations and buildings clustered around farms. Boundaries are a mixture of clipped hedge, ditch and rows of columnar trees. Urban fringe and leisure developments are an intrusive feature of the agricultural area.

LCA-11 Perceptual characteristics

Scale and appearance
Fields are large and rectilinear. The area has an open character, but rows of trees do limit long distance views. Views outward feature tall structures such as apartment blocks in Blacon, Connah's Quay Power Station and the Flintshire Bridge. Views of industrial areas of Queensferry and the aircraft factory in Broughton are available from the western edges nearest to the River Dee.
Tranquillity
Human access is infrequent and, away from the outer edges of this area, it is tranquil. The A494 influences the north-western portion and the A548 Sealand Road the north-eastern edge.
Night-time changes
There are a few sources of light from the clustered farms and businesses based in the area but the main source of light is overspill from Chester West Employment Park to the east, Broughton Aircraft Factory to the south and Queensferry and the A494 to the west.

LCA-11 Historic and cultural designations

Field patterns have remained largely unchanged throughout the twentieth century, except for loss of areas to development. Ferry Bank Farm is a Grade II listed building. Several other farm buildings and farm ponds are of historic interest. A shelterbelt of woodland along the Sealand bank and drain near to Blacon Point is designated as ancient semi-natural woodland.

LCA-11 Value and susceptibility to change

Reclaimed landscape has listed buildings and local landscape designation. Landscape value is judged as Medium.
North-western edge is immediately adjacent to the A494 and would experience direct physical change. The area is of large scale, open and deemed to be of moderate scenic quality. It is an agricultural landscape that has open and uninterrupted views of the Dee Bridge in places. The susceptibility to change is judged as Low.

LCA-11 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA-11 is judged as Low.

LCA-12: Shotton Steelworks Recreation Area

9.1.13 Sports ground associated with Shotton Steelworks. Boundary defined by Chester and Holyhead railway to south-west, Wrexham-Bidston railway to north-west, River Dee south embankment levees to north-east and Rowley's Drive and reclaimed saltmarsh to south-east.

Table 9-12 LCA-12 Shotton Steelworks Recreation Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-Connah's Quay Dee frontage
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-124 Connah's Quay Dee frontage

LCA-12 Physical characteristics

Landform, landcover and pattern
Reclaimed saltmarsh parcel severed from surroundings by railway cutting, railway embankment, River Dee south embankment and Rowley's Drive. Landcover predominantly amenity grassland active recreation grounds bounded by semi-natural woodland and planted rows of trees. Dee Bank Cottage dwellings and sports pavilions/club houses and social centre are the only buildings.

LCA-12 Perceptual characteristics

Scale and appearance
Small scale and of enclosed character. Views outward are limited by vegetation and embankments.
Tranquillity
Frequent access for recreation and occupation by cyclists and pedestrians using Rowley's Drive and the footpath next to the railway embankment. Also, frequent access for recreation by users of the sports facilities. Screened from road traffic noise by built-up areas of Shotton, intermittent disturbance caused by trains using both railway lines.
Night-time changes
Surrounding vegetation limits influence of light pollution form Shotton. Ther are small streetlights along Rowley's Drive and around the sports buildings, but the pitches are not floodlit.

LCA-12 Historic and cultural designations

Locally important sports facility with historic link to steelworks. No historic, nature conservation or landscape designation.

LCA-12 Value and susceptibility to change

Non-designated area, locally important to Shotton residents, the landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views of the Dee Bridge and road structures interrupted by a combination of earthwork embankment, trees and buildings. It is at an intermediate distance from the Scheme. The area is small scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-12 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 12 is judged as Negligible and will be filtered out from further assessment.

LCA-13: Wepre Brook Agriculture

9.1.14 Farmland to north of the A55/A494 and Ewloe Green. The north-western boundary is defined by the Wepre Brook wooded valley, the north-eastern boundary by the Wrexham-Bidston railway line and built-up areas of Higher Shotton.

Table 9-13 LCA-13 Wepre Brook Agriculture

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-196 Hawarden and 752 Northop-Buckley-Broughton

LANDMAP Aspect Layer	LANDMAP Aspect Area
Landscape Habitats	FLNT-LH-Northop-mosaic
Visual and Sensory	FLNT-VS-014 Coastal slopes Mostyn to Ewloe
Historic Landscape	FLNT-HL-213 Northop Hall
Cultural Landscape Services	FLNT-CLS-033 Coastal Slopes Flint to Ewloe

LCA-13 Physical characteristics

Landform, landcover and pattern
Lowland valleys side of gently sloping and rolling landform bisected by steep-sided wooded valleys of tributary brooks. Landcover is predominantly arable and pastoral farmland with some blocks of woodland and seasonal ponds. Settlement consists of scattered rural dwellings and businesses and encroachment of the more concentrated settlements along roads such as the B5125 Stamford Way and Shotton Lane. Field boundaries are a mixture of unmanaged and clipped hedges, field shapes are irregularly shaped, and their size determined by the steepness of the ground.

LCA-13 Perceptual characteristics

Scale and appearance
Medium scale and with a mixed sense of enclosure. Some parts offer expansive views towards the Wirral and the Cheshire sandstone ridge, other parts are more insular, and outward views are limited by roadside banks and hedgerows. Attractive outward views with large scale industrial visual detractors including at Shotton and Deeside Industrial Park.
Tranquillity
Main road infrastructure and railway generate a constant background noise. Roads and lanes crossing the area are active, connecting Northop and Northop Hall to Ewloe and Hawarden. Infrequent access for recreation along many footpaths between Shotton and Ewloe Green, including access to Ewloe Castle and Wepre Park within the Wepre valley.
Night-time changes
Some influence from St David's park and the A494/A55 interchange, and built-up areas of Shotton and Connah's Quay. Very few internal light sources.

LCA-13 Historic and cultural designations

Ewloe Castle is a scheduled monument within the neighbouring character area. There are a cluster of Grade II listed buildings at Castle Hill farm. Neighbouring Wepre valley is designated as SSSI and SAC, which extends to include Castle Hill Farm. Locally designated as Green Barrier.

LCA-13 Value and susceptibility to change

Minor part of the character area internationally designated for nature conservation. Locally designated as a buffer between settlements. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme, it is at an intermediate to long distance away. The area is medium scale, of mixed enclosure and deemed to be of moderate scenic quality. It is an agricultural landscape set within suburban settlement limits road and rail infrastructure. Intervisibility with the Dee Bridge is interrupted by Higher Shotton and Queensferry. The susceptibility to change is judged as Negligible.

LCA-13 Sensitivity

Combining Medium value and negligible susceptibility to change, the landscape sensitivity of LCA 13 is judged as Low.

LCA-14: Wepre Crossing Recreational Area

9.1.15 Western boundary defined by Wepre Gutter, northern by the River Dee southern embankment, eastern by the Wrexham-Bidston railway embankment and southern by the Chester and Holyhead railway cutting.

Table 9-14 LCA-14 Wepre Crossing Recreational Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-078 Connah's Quay Dee frontage
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-124 Connah's Quay Dee frontage

LCA-14 Physical characteristics

Landform, landcover and pattern
Flat land reclaimed from saltmarsh in about 1750. The Wepre Gutter marks the end of the River Dee south embankment and where the canal widens into estuary. A disused branch of the Wrexham-Bidston railway line connected that line to dock at Connah's Quay. The Dee Park is an informal recreation space with areas of woodland, wetland and grassland managed for wildlife benefits and for leisure. Dock Road sewage treatment plant is located at the western end.

LCA-14 Perceptual characteristics

Scale and appearance
The area is of large scale and enclosed by semi-natural woodland that has developed along railway cutting and embankment slopes. The redevelopment of the park for community benefits is recent.
Tranquillity
Infrequent access for recreation, the Wales Coast Path passes through the area. Intermittent background noise from the Chester and Holyhead and Wrexham-Bidston railways.
Night-time changes
Few internal light sources, limited to sewage treatment plant and Dock Road. Significant influence form Deeside Industrial Park and Shotton Mills across the River Dee.

LCA-14 Historic and cultural designations

Adjacent canal and estuary internationally designated as SSSI, SAC, SPA and Ramsar wetland. Remains of industry and land severed by railways has been repurposed for community benefit.

LCA-14 Value and susceptibility to change

Non-designated area crossed by Wales Coast Path and National Cycle Route, important facility for local residents. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views of the Dee Bridge and road structures interrupted by Hawarden Bridge and earthwork embankment with. It is at an intermediate to long distance from the Scheme. The area is large scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-14 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 14 is judged as Negligible and will be filtered out from further assessment.

9.2 Seascape Character Areas

9.2.1 This section is to be read in conjunction with Figure 9.9 (395318-RML-ZZ-XX-DR-L-9009).

LCA-15: River Dee Estuary

9.2.2 River Dee estuary downriver from Wepre Gutter. Boundary defined by mean high water level. The estuary is a dynamic area and will encroach into Burton Marsh during the high spring tides.

Table 9-15 LCA-15 River Dee Estuary

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-165 Dee Estuary
Landscape Habitats	FLNT-LH-022 Dee Estuary mosaic
Visual and Sensory	FLNT-VS-075 Dee salt marsh fringes and 083 River Dee
Historic Landscape	FLNT-HL-326 Dee Estuary
Cultural Landscape Services	FLNT-CLS-129 River Dee

LCA-15 Physical characteristics

Landform, landcover and pattern
Flat open coastal landscape where the canal's shape funnel's out into the estuary. Landcover is open water, sand and mud, salt marsh and tidal rivulets. At the water's edge are docks, landing stages, breakwaters, navigational aid beacons and National Grid pylons.

LCA-15 Perceptual characteristics

Scale and appearance
Very large scale and open aspect. Large-scale industry, power stations and infrastructure, Flintshire bridge and road infrastructure dominate the estuary at Connah's Quay.
Tranquillity
Infrequent access to the water surface, docks and landing stages. Influenced by neighbouring developments of road, power generation and industry.
Night-time changes
Significant light pollution influence from Deeside Industrial Park and slight influence from Connah's Quay and Kelsterton.

LCA-15 Historic and cultural designations

Connah's Quay Dock Basin is a Grade II listed building. A number of shipwreck sites. Internationally designated as SSSI, SAC, SPA and Ramsar wetland for nature conservation.

LCA-15 Value and susceptibility to change

Internationally designated for nature conservation, the landscape value is judged as Very high.
The Estuary is at a long distance from the Scheme. Views of the Dee Bridge along the canal portion of the River Dee are interrupted by Hawarden Bridge. Downriver of Wepre Gutter the river begins to gently meander breaking the line of sight upriver. The area is very large scale, of open aspect and deemed to be of high scenic quality. The susceptibility to change is judged as High.

LCA-15 Sensitivity

Combining high value and high susceptibility to change, the landscape sensitivity of LCA 14 is judged as High.

9.3 Townscape Character Areas

9.3.1 This section is to be read in conjunction with Figure 9.9 (395318-RML-ZZ-XX-DR-L-9009).

LCA-16: Aston – Aston Hall Settlement

9.3.2 Suburban settlement severed from Aston by the dualled A494. Connection available to pedestrian through an underpass at the end of Mountfield Road or to vehicles via Plough Lane bridge. South-western boundary defined by Wrexham-Bidston railway line, other edges defined by limit of built-up area.

Table 9-16 LCA-16 Aston – Aston Hall Settlement

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban areas
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay and 538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-044 Aston Hall

LCA-16 Physical characteristics

Landform, landcover and pattern
Suburban settlement infill between A494 Aston Hill and Aston Hall before the construction of the dualled A494. A mixture of terraced, semi-detached and detached dwellings developed along Aston Hall Lane, Moorfield, Mountfield and Hillfield Roads. Aston Mead crescent has since been demolished and replaced by Llys Gary Speed estate.

LCA-16 Perceptual characteristics

Scale and appearance
Medium scale and enclosed aspect. Attractive outward views of farmland available from the edges of the settlement.
Tranquillity
Significantly influenced by the dualled A494, there is no barrier to noise or the view of traffic from residential properties facing the road. Wrexham-Bidston railway line provides intermittent noise. Aston Hall Lane is frequently used for access between Aston/Queensferry and Hawarden.
Night-time changes
Mid way between St David's Park and Queensferry, main light source is A494.

LCA-16 Historic and cultural designations

Cluster of Grade II* and Grade II listed buildings at Aston Hall. Edge of settlement designated as Green Barrier.

LCA-16 Value and susceptibility to change

Locally valued/designated. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by field boundary hedgerows and trees. It is at an intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-16 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA 16 is judged as Low.

LCA-17: Aston Residential Area

9.3.3 Suburban settlement and gradual infilling of farmland between Aston Park Road, Aston Hill and the Wrexham-Bidston railway line during the twentieth century. Historic core of buildings at Higher Shotton and along Aston Hill.

Table 9-17 LCA-17 Aston Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-17 Physical characteristics

Landform, landcover and pattern
Suburban settlement infill between Aston Hill, Aston Park Road and Arexham to Bidston railway line. Residential streets with a mixture of detached and semi-detached dwellings. New Park Road and Summerdale Road parts of the original estate development, which expanded to fill the triangle of land from 1950s to 1970s.

LCA-17 Perceptual characteristics

Scale and appearance
Medium scale and enclosed aspect. Outward views available along the line of streets towards the River Dee and Cheshire.
Tranquillity
Frequent access for habitation. Side facing the dualled A494 significantly influenced by traffic noise and movement. There are some fences and hedges that provide a barrier next to the road corridor.
Night-time changes
Mid way between St David's Park and Queensferry, main light source is A494.

LCA-17 Historic and cultural designations

No historic, nature conservation or landscape designation. Largely twentieth century development.

LCA-17 Value and susceptibility to change

Non-designated settlement, medium scale and enclosed. Deemed to be of low scenic quality. Landscape value is judged as low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by built-up areas in Shotton. The susceptibility to change is judged as Negligible.

LCA-17 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 17 is judged as Negligible and as such is filtered out from further assessment.

LCA-18: Connah's Quay – High Street

9.3.4 Commercial centre from Wepre Brook to Kelsterton. North-eastern boundary defined by the Chester and Holyhead railway.

Table 9-18 LCA-18 Connah's Quay – High Street

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckleyy-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-18 Physical characteristics

Landform, landcover and pattern
Linear high street with terraced housing, shops, retail units and institutional and religious buildings facing the high street. Side streets and alleys allow for other residential and business areas with good connectivity to the High Street.

LCA-18 Perceptual characteristics

Scale and appearance
Medium scale and enclosed. Outward views limited to those along the line of the High Street. Developed to serve the docks and industry at Connah's Quay in the nineteenth century and then gradually infilled during the late nineteenth and early twentieth century. Typically, red-brick buildings and Tudor/Elizabethan revival features. Modern retail units contrast with original buildings.
Tranquillity
Busy high street, dominated by traffic.
Night-time changes
Streetlights and retail units are the main source of light pollution.

LCA-18 Historic and cultural designations

A cluster of Grade II listed buildings at St Mark's church. The war memorial and the Ship Inn also Grade II listed. No other protected status.

LCA-18 Value and susceptibility to change

No cultural, nature conservation or landscape designations. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by the Wrexham-Bidston railway embankment. The majority of the street is a long distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-18 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 18 is judged as Negligible, and as such is filtered out from further assessment.

LCA-19: Connah's Quay – Wepre Residential Area

9.3.5 Suburban residential area to north of Wepre Brook. Western boundary formed by Wepre Park road, northern boundary by B5126 Mold Road and north-eastern boundary by the B5129 High Street.

Table 9-19 LCA-19 Connah's Quay – Wepre Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-19 Physical characteristics

Landform, landcover and pattern
Suburban settlement infill between the Wepre valley and Mold Road. Residential streets with a mixture of detached, semi-detached and terraced housing. Institutional buildings with open space and parkland. Sports facilities and play areas. Originally some ribbon development along Mold Road and Mill Lane, then terraced streets of Fron Road and Dee Road were built. Gradually agricultural land and parkland associated with Wepre Hall were developed with a mixture of building styles and finishes.

LCA-19 Perceptual characteristics

Scale and appearance
Medium scale and enclosed aspect. Outward views available along the line of streets towards the Dee Estuary and The Wirral. Deemed to be of low scenic quality and character.
Tranquillity
Frequent access for habitation, recreation and occupation. Mold Road and High Street busy with traffic.
Night-time changes
Streetlights in residential streets are the main source of light pollution.

LCA-19 Historic and cultural designations

Institutional buildings and religious buildings are recorded as national monuments. Adjacent Wepre Park and wood statutorily protected for nature conservation and recorded as Ancient Woodland.

LCA-19 Value and susceptibility to change

No cultural, nature conservation or landscape designations. Landscape value is judged as Low
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by the Wrexham-Bidston railway embankment and the Wepre Valley woodland. The majority of the area is a long distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible

LCA-19 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 18 is judged as Negligible, and as such is filtered out from further assessment.

LCA-20: Deeside Industrial Park - Parkway

9.3.6 Large-scale industrial and business park. Northern boundary defined by the dualled A548, eastern boundary by the A494/A550, southern boundary by the former Great Central Railway line, and western boundary by the Shotwick Brook lagoons and National Grid power lines.

Table 9-20 LCA-20 Deeside Industrial Park - Parkway

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-021 Sealand industrial area
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-20 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed saltmarsh and infilled land. Developed as Industrial Park. Large-scale industrial units aligned to formal road layout. Block planting and amenity grassland associated with corporate office buildings at prime locations next to Parkway.

LCA-20 Perceptual characteristics

Scale and appearance
Large-scale and enclosed by road and power infrastructure. The central alignment Parkway has an open and empty aspect, but the large-scale buildings within the flat landform limit outward views.
Tranquillity
Frequent access for occupation. Lots of empty space dedicated for traffic and parking.
Night-time changes
Significant source of light pollution.

LCA-20 Historic and cultural designations

Cluster of aircraft hangars associated with RAF Sealand are Grade II listed buildings. No other cultural, nature conservation or landscape designation. Important employment site in the region.

LCA-20 Value and susceptibility to change

No cultural, nature conservation or landscape designations. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Dee Bridge are interrupted by planting on the disused railway line. The area is at an intermediate to long distance from the Scheme. The area is large scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible

LCA-20 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 20 is judged as Negligible, and as such is filtered out from further assessment.

LCA-21: Deeside Industrial Park – Shotton Steelworks

9.3.7 Large-scale industrial site dedicated to the production of steel for the construction industry. Southern boundary formed by the Dee Estuary, western boundary by the dualled A548, northern by the settlement and water supply lagoons and Tenth Avenue part of Deeside Industrial Park, and eastern boundary by the Wrexham-Bidston railway line and Birkenhead Junction with the disused Great Central Railway line.

Table 9-21 LCA-21 Deeside Industrial Park – Shotton Steelworks

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-21 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed saltmarsh and infilled land. Development as steelworks site began in the late nineteenth century and quickly expanded in the early twentieth century. Wrexham-Bidston and Great Ventral railway lines constructed to supply coal and iron ore to, and move freight from the steelworks, in addition to jetties on the River Dee. The blast furnace sites to the north of the lagoons were redeveloped as the Weighbridge Road part of Deeside Industrial Park.

LCA-21 Perceptual characteristics

Scale and appearance
Large-scale and enclosed by road and power infrastructure. There are open aspect areas next to the River Dee and Dee Estuary.
Tranquillity
Frequent access for occupation.
Night-time changes
Significant source of light pollution.

LCA-21 Historic and cultural designations

Building associated with the steelworks are recorded as National Monuments. The adjacent River Dee and Dee Estuary is statutorily protected for nature conservation. No landscape designation. Historically an important employment site that facilitated the rapid expansion of Connah's Quay and Shotton.

LCA-21 Value and susceptibility to change

No important cultural, nature conservation or landscape designations within the character area. Landscape value is judged as Low
There would be no direct impact due to the Scheme. Views towards Dee Bridge are interrupted Hawarden Bridge and the Wrexham-Bidston line. The area is at an intermediate to long distance from the Scheme. The area is large scale, of mixed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible

LCA-21 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 21 is judged as Negligible, and as such is filtered out from further assessment.

LCA-22: Deeside Industrial Park – Tenth Avenue

9.3.8 Large-scale industrial and business park. Northern boundary defined by the dualled A548, south-eastern boundary by the Shotwick Brook and lagoons and south-western boundary by the Wrexham-Bidston railway line.

Table 9-22 LCA-22 Deeside Industrial Park – Tenth Avenue

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-021 Sealand industrial area and 023 Hawarden mosaic

LANDMAP Aspect Layer	LANDMAP Aspect Area
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-22 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed saltmarsh and infilled land. Large-scale industrial units set within a triangular shaped land parcel. Layout is formal with roads branching from the main alignment of Tenth Avenue.

LCA-22 Perceptual characteristics

Scale and appearance
Large-scale and enclosed by road, rail and power infrastructure. Plots yet to be developed or being redeveloped create open areas within the industrial park.
Tranquillity
Frequent access for occupations.
Night-time changes
Significant source of light pollution.

LCA-22 Historic and cultural designations

Toyota factory recorded as National Monument. No cultural, nature conservation or landscape designations. Important employment site in the region.

LCA-22 Value and susceptibility to change

No cultural, nature conservation or landscape designations. Landscape value is judged as Low
There would be no direct impact due to the Scheme. Views towards Dee Bridge are interrupted by planting at Birkenhead Junction and around the Shotwick Brook lagoons. The great majority of the area is a long distance from the Scheme. The area is large scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-22 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 22 is judged as Negligible, and as such is filtered out from further assessment.

LCA-23: Ewloe Green Settlement

9.3.9 Suburban settlement having developed along Mold Road and Aston Hill. Southern boundary defined by the A55/A494 including Ewloe Interchange. Northen boundary defined by limit of built-up area and boundary with agricultural land.

Table 9-23 LCA-23 Ewloe Green Settlement

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area and 039 Northop mosaic
Visual and Sensory	FLNT-VS-014 Coastal slopes Mostyn to Ewloe
Historic Landscape	FLNT-HL-213 Northop Hall and 846 Buckley and Ewloe
Cultural Landscape Services	FLNT-CLS-Coastal slopes Flint to Ewloe

LCA-23 Physical characteristics

Landform, landcover and pattern
Gently undulating lowland valley side. Ribbon development along Mold Road/Old Aston Hill, then gradual development at junction of the B5125 Holywell Road (formerly A55) with the B5127 Mold Road (formerly A494), which lead to the infilling of agricultural fields near to those two roads in the late twentieth century. Mixture of detached, semi-detached and terraced dwellings with commercial properties at main road junctions. Fields to the south of the settlement severed by the dualled A494 have been allowed to develop into rough grassland, scrub and amenity areas for recreation, or maintained as small livestock and equestrian paddocks. The open areas give this settlement a rural village character.

LCA-23 Perceptual characteristics

Scale and appearance
Medium scale and open aspect to the north but enclosed by roadside plantations to the south. Attractive outward views of the head of the Wepre valley available to the edges of the settlement.
Tranquillity
Significantly influenced by the dualled A494, the B5125 and B5127. Wrexham-Bidston railway line provides intermittent noise. The B5125 serves Northop and Northop Hall, the B5127 serves Buckley and the roads meet at the St David's Park junction.
Night-time changes
St David's Business Park and the major road junctions are significant sources of light pollution.

LCA-23 Historic and cultural designations

Church of the Holy Spirit in Aston Hill is a Grade II listed building. Other religious buildings are recorded as National Monuments. The western part of the settlement near to the A55/A494 Interchange is locally recognised as Green Barrier.

LCA-23 Value and susceptibility to change

Landscape of local recognition. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by built-up areas of Shotton, A494 roadside and Wrexham-Bidston rail-side vegetation. It is a long distance from the Scheme. The area is medium scale, enclosed and deemed to be of moderate scenic quality. The susceptibility to change is judged as Negligible.

LCA-23 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA 23 is judged as Low.

LCA-24: Hawarden – Gladstone Way Residential Area

9.3.10 Suburban settlement having developed on the sloping valley side next to the A550 Gladstone Way. Boundary defined by the settlement extent with the Wrexham-Bidston railway line in south-west and the former Aston Colliery railway to north-west.

Table 9-24 LCA-24 Hawarden – Gladstone Way Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-196 Hawarden and 752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-24 Physical characteristics

Landform, landcover and pattern
Suburban settlement with formal street layout. Largely completed in the mid-twentieth century on the flatter ground then gradually the gently sloping ground up to the railway line infilled. Mixture of detached and semi-detached properties, predominantly red brick and render.

LCA-24 Perceptual characteristics

Scale and appearance
Medium scale and of mixed aspect. At the northern end where the ground is flat the area is enclosed by neighbouring properties and field boundary vegetation. At the southern end where the ground is gently rising expansive views of Cheshire, the Deeside Industrial Park and Factory Road Industry are available, particularly to streets with a south-west to north-east alignment such as Overlea Drive, Fieldside and Hillside.
Tranquillity
Frequent access for habitation. Gladstone Way is the main link between Hawarden and Queensferry.
Night-time changes
Streetlighting and dwellings main light source within area but influenced by Queensferry town centre and industrial areas.

LCA-24 Historic and cultural designations

Grade II listed buildings at Brick House Farm. Site of former Blackbrook Avenue colliery. No significant cultural, nature conservation or landscape designation.

LCA-24 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are available to the streets at higher elevation. It is at an intermediate distance from the Scheme. The area is medium scale, of mixed character and deemed to be of low scenic quality. Views of the area around Dee Bridge are available. The susceptibility to change is judged as Low

LCA-24 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 24 is judged as Low.

LCA-25: Mancot – Mancot Residential Area

9.3.11 Suburban settlement having developed from the village of Big Mancot, Little Mancot Farm and the RAF military residence of Mancot Royal. Boundary is defined by the settlement limit with Mancot Lane forming a north-western limit and Chester Road East forming a north-eastern limit.

Table 9-25 LCA-25 Mancot – Mancot Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton and 981 Saltney
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-25 Physical characteristics

Landform, landcover and pattern
Flat lowland valley and reclaimed saltmarsh. Suburban infill between Big Mancot and Chester Road East. Dwellings are a mixture of detached, semi-detached and terraced buildings with private gardens and shared green spaces. Construction material is predominantly of red brick. Street layout is based on branches from the alignment of Mancot Lane (formerly a tramway connecting Mancot Farm Colliery to the Queensferry Chemical Works and landing stage at the River Dee), and Ash Lane/Hawarden Way.

LCA-25 Perceptual characteristics

Scale and appearance
Medium scale and enclosed aspect. Attractive outward views of farmland available from the edges of the settlement. Some of the buildings at Big Mancot and Mancot Royal are of attractive design, with the style copied for the much of the suburban area.
Tranquillity
Frequent access for habitation. Some influence for Chester Road East.
Night-time changes
Streetlighting and dwellings main light source within area but influenced by Queensferry town centre and Chester Road/Factory Road industrial areas.

LCA-25 Historic and cultural designations

No listed buildings, religious buildings are recorded as National Monuments. Former uses as colliery and historic connections to RAF Sealand. Several green spaces. No nature conservation designation.

LCA-25 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by neighbouring buildings, retail and industrial areas. It is at an intermediate distance from the Scheme. The area is medium scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-25 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 25 is judged as Negligible, and as such is filtered out from further assessment.

LCA-26: Mancot – Pentre Residential Area

9.3.12 Located next to the B5156 Chester Road to the south-east of Queensferry Roundabout. Boundaries are determined by the limit of the residential area.

Table 9-26 LCA-26 Mancot – Pentre Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 981 Saltney
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-26 Physical characteristics

Landform, landcover and pattern
Lowland levels. Village established at the crossroads between B5156 Chester Road and Chemistry Lane / Mancot Lane. Nineteenth century buildings and terraced houses gradually infilled and expanded with twentieth century housing estates.

LCA-26 Perceptual characteristics

Scale and appearance
Linear forms developed along roads. Boundaries are a mixture of wall types, evergreen hedges and fence types. Different styles of building and boundary create disunity. Buildings at the edge of the settlement benefit from outward views of agricultural areas whilst others experience views of industrial and retail areas. Small scale and enclosed settlement, views northward limited by main settlement, eastward by industry, southward is more open, but the view is limited by hedgerows and trees, westward limited by gently rising landform.
Tranquillity
Frequent human access on roads and lanes for occupation and habitation disturbs tranquillity.
Night-time changes
Streetlights and individual properties contribute to light sources within the area. Also influenced by overspill from neighbouring areas of industry and Queensferry town centre.

LCA-26 Historic and cultural designations

Historic association with Queensferry Chemical Works. Religious buildings are recorded as National Monuments. No other significant nature conservation or landscape designation.

LCA-26 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are available to the dwellings at the edge of the residential area. It is a near to intermediate distance from the Scheme. The area is small scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-26 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 26 is judged as Low.

LCA-27: Mancot – Willow Park Residential Area

9.3.13 Located next to the A550 to the south of Queensferry Roundabout. Boundaries determined by edge of development and the A550 Gladstone Way.

Table 9-27 LCA-27 Mancot – Willow Park Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-072 Shotton farmland fringe
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-107 Shotton farmland fringe

LCA-27 Physical characteristics

Landform, landcover and pattern
Lowland levels. Residential park and suburban housing located on the site of the former Queensferry Colliery and old clay pits. Late twentieth century buildings and mobile homes arranged in linear forms.

LCA-27 Perceptual characteristics

Scale and appearance
Buildings located off Dyfed Drive are surrounded by other buildings and plantations screening views of Queensferry Roundabout and have an enclosed aspect. Homes within the residential park have a more open aspect although outward views of agricultural spaces are limited by hedges. Internal boundaries are a mixture of wall and fence types. The closely spaced homes create an area of intimate scale. 132 kV power lines cross through the site.
Tranquillity
Dwellings benefit from vegetation screening views of the main roads that run close by but there is little to limit sounds generated by traffic.
Night-time changes
Streetlights and individual properties contribute to light sources within the area. Main influence is overspill from Queensferry town centre.

LCA-27 Historic and cultural designations

Little evidence of Queensferry Colliery and Aston Colliery Railway remains on the surface. No significant nature conservation or landscape designation.

LCA-27 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are available to the dwellings at the edge of the residential area. It is a near to intermediate distance from the Scheme. The area is small scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-27 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 27 is judged as Low.

LCA-28: Queensferry – Chemistry Lane Industry and Sewage Works

9.3.14 Located between the River Dee to the north-east, Chemistry Lane to the south-east, the Chester and Holyhead Railway to the south-west and A494 to the north-west. Part of Sandycroft Industrial Park that is within the Deeside Enterprise Zone.

Table 9-28 LCA-28 Queensferry – Chemistry Lane Industry and Sewage Works

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-28 Physical characteristics

Landform, landcover and pattern
Lowland levels. Mixed use including sewage treatment works, pumping station, light industrial units, haulage depot, site of scrap yard and caravan park located on the site of the former Queensferry Chemical Works and Shipbuilding and Engineering Works, railway lines/sidings connecting the Chester and Holyhead Railway to the Aston Colliery Railway / Dundas Sidings and River Dee landing stage. Modern uses are clustered.

LCA-28 Perceptual characteristics

Scale and appearance
Sites are bounded by a mixture of security fences, rows of trees, hedges and earthworks with no inter-connectivity. Generally, the area has an open aspect with access to the river edge and salt marsh. There are also parts that feel enclosed, such as footpaths that follow the old railway lines that are enclosed by rows of trees and security fences, and the caravan park that is enclosed by earthworks.
Tranquillity
Located next to a busy road, railway line and industrial estate. There is frequent human access near to the main road, elsewhere access is infrequent. This is a noisy area.
Night-time changes
Security lights and individual properties contribute to light sources within the area. The main influence is overspill from industrial areas to the south-east and north-west.

LCA-28 Historic and cultural designations

Remains of landing stages visible at river side. Next to River Dee designated ecological sites. Row of mature Poplars that separate Chemistry Lane and the Sewage Treatment Works have Tree Preservation Order.

LCA-28 Value and susceptibility to change

Adjacent to River Dee, which is internationally protected for nature conservation and designated as SAC and SSSI. No significant cultural heritage or landscape designation. Landscape value is judged as Low.
The area would be directly affected by the Scheme. This is a man-made landscape of industrial land use with a residential area within it. Generally, of medium scale and mixed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-28 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 28 is judged as Low.

LCA-29: Queensferry – Chester Road Industry and Pentre Trade Park

9.3.15 Located between the Chester and Holyhead Railway and the B5156 Chester Road. The south-eastern limit is defined by the settlement of Sandycroft. The north-western limit is defined by the A494. Part of Sandycroft Industrial Park is within the Deeside Enterprise Zone.

Table 9-29 LCA-29 Queensferry – Chester Road Industry and Pentre Trade Park

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 981 Saltney
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre and 072 Shotton farmland fringe
Historic Landscape	FLNT-HL-Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre and 107 Shotton farmland fringe

LCA-29 Physical characteristics

Landform, landcover and pattern
Lowland levels. Ribbon development of residential properties along the B5129 Chester Road and then twentieth century industrial and retail infill of farmland reclaimed from marsh between road and railway.

LCA-29 Perceptual characteristics

Scale and appearance
Large scale enclosed area.
Tranquillity
Constant human access for occupation and habitation with influence from road and railway.
Night-time changes
Significant light source within industrial and retail areas.

LCA-29 Historic and cultural designations

Site of former Queensferry Wireworks that has been redeveloped. Glebe Farm next to the railway on Rector's Lane recorded as National Monument. No significant cultural, nature conservation or landscape designation.

LCA-29 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
A minor part of the area would be directly affected by the Scheme. This is a man-made landscape of industrial and retail use with some isolated pockets of residential areas. Generally, of medium scale and mixed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-29 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 29 is judged as Low.

LCA-30: Queensferry – Factory Road Industry

9.3.16 Located between the River Dee and the Chester and Holyhead Railway. South-eastern boundary determined by limit of industrial area. North-western boundary determined by Chemistry Lane. Part of Sandycroft Industrial Park that is within the Deeside Enterprise Zone.

Table 9-30 LCA-30 Queensferry – Factory Road Industry

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-025 Sealand grassland and 030 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay

LANDMAP Aspect Layer	LANDMAP Aspect Area
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-30 Physical characteristics

Landform, landcover and pattern
Lowland levels. Mosaic of industrial units, caravan parks and isolated dwellings, bare ground and pockets of scrub woodland and rough grassland. Gradual infilling of marshland reclaimed for agriculture began with the Foundry and Engine Works at Sandycroft then the Ferry Engineering Works at Pentre.

LCA-30 Perceptual characteristics

Scale and appearance
Large scale and enclosed area.
Tranquillity
Constant human access for occupation and habitation with influence from Chester and Holyhead railway.
Night-time changes
Significant light source within industrial areas.

LCA-30 Historic and cultural designations

Ferry Engineering Works are Grade II listed buildings. Row of Sycamore Trees next to Railway Terrace in Saltney have Tree Preservation Order. Foundry buildings adapted for modern light industrial use, Sandycroft Quay remains. Next to the River Dee designated nature conservation sites.

LCA-30 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
The northern boundary is formed by Chemistry Lane, which would be within the Scheme's site boundary. This is a man-made landscape of industrial and retail use with some isolated pockets of residential areas. Of large scale and enclosed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-30 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 30 is judged as Low.

LCA-31: Queensferry – Station Road Industry

9.3.17 Located between the River Dee and the Chester and Holyhead Railway to the north-west of the A494. An area of retail and office properties with a small cluster of

houses near to the Bascule Bridge. Boundaries are defined by river, road and rail corridor to east, south and west. To the north the boundary is defined by the extent of the built-up area.

Table 9-31 LCA-31 Queensferry – Station Road Industry

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-31 Physical characteristics

Landform, landcover and pattern
Lowland level, mosaic of retail and office units, bare ground and amenity grassland with trees and shrubs.

LCA-31 Perceptual characteristics

Scale and appearance
Large scale and enclosed by transport corridors.
Tranquillity
Constant human access for occupation with influence from A494.
Night-time changes
Significant light source within business areas.

LCA-31 Historic and cultural designations

Bascule Bridge is a Grade II listed building registered in the Queensferry and Sealand communities. Station Road is part of the National Cycle Network and the Wales Coast Path crosses the northern corner of the LCA near to Bridge Villas and the Bascule Bridge. Next to the River Dee designated nature conservation sites.

LCA-31 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
The southern boundary is formed by the A494 road corridor and part of the Scheme's site boundary links to the B5441 Station Road. A man-made industrial/retail landscape with pockets of residential use. Of large scale and enclosed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-31 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 31 is judged as Low.

LCA-32: Queensferry Town Centre

9.3.18 Located to the north of Queensferry Roundabout. Developed around The Cross, the junction between Mold Road/Station Road and Chester Road after the construction of the railway. The boundaries are defined by the railway to the east, the A494 to the south, the residential area of Shotton to the west and the commercial centre of Shotton to the north.

Table 9-32 LCA-32 Queensferry Town Centre

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-32 Physical characteristics

Landform, landcover and pattern
Lowland levels to undulating lowland. Residential areas, retail and business areas, leisure centre and schools with sports pitches. Retail, leisure and community developments have filled in the former fields between the historic core and of Queensferry and Shotton.

LCA-32 Perceptual characteristics

Scale and appearance
Medium scale enclosed. The historic core mostly consists of nineteenth century red brick-built buildings with slate roofs. Late twentieth century development has introduced a mixture of large-scale buildings, with differing materials and surface finishes, and road layout changes to deal with congestion that prioritise vehicle movement. This has had a detrimental effect on the scale and harmony of the historic streets.
Tranquillity
Constant human access, noise influenced by road and rail. Chester Road and Station Road are busy and the neighbouring A494 and railway add to the levels of noise and movement.

Night-time changes
Significant light source generated within area, with influence over neighbouring areas.

LCA-32 Historic and cultural designations

Queensferry War Memorial institute is a Grade II listed building. Station Road and Chester Road East are part of the National Cycle Network (NCN) connecting with Sandycroft and Sealand. The NCN route is shared with all traffic.

LCA-32 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
The southern boundary is formed by the A494 road corridor and parts of the residential Queen Street and Dundas Street would be next to the Scheme's site boundary. Of mixed scale and enclosed aspect and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-32 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 32 is judged as Low.

LCA-33: RAF Sealand

9.3.19 Aircraft maintenance hangars and barracks housing. Western boundary formed by A494 between Drome Corner and Shotwick Interchange. North-eastern boundary formed by Green Lane, and southern boundary formed by limist of MOD land and the Chester Millennium Greenway cycle track on a disused section of the Great Central Railway.

Table 9-33 LCA-33 RAF Sealand

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-021 Sealand industrial area
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-046 RAF Sealand

LCA-33 Physical characteristics

Landform, landcover and pattern
Flot lowland reclaimed saltmarsh. Triangular parcel of land enclosed by roads and railway. Boundaries formed of security fencing and rows of Lombardy poplar. Hangars, industrial units, offices and barracks formally laid out within areas of amenity grassland and shared open space.

LCA-33 Perceptual characteristics

Scale and appearance
Large scale and enclosed aspect.
Tranquillity
Frequent access for occupation. Significant influence from A494 road corridor.
Night-time changes
Significant source of light pollution combining with A494 road corridor and Deeside Industrial Park.

LCA-33 Historic and cultural designations

Barracks, camp buildings and workshops recorded as heritage assets. No significant cultural, nature conservation or landscape designation.

LCA-33 Value and susceptibility to change

Non-designated built-up area, historically connected with former Queensferry Airfield. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards River Dee Bridge are interrupted by vegetation on the embankment of the Chester Millennium Greenway former railway. It is at an intermediate distance from the Scheme. The area is large, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-33 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 33 is judged as Negligible, and as such is filtered out from further assessment.

LCA-34: River Dee Estuary – River Road

9.3.20 Narrow strip of land in between Shotton Steelworks and the River Dee, and downriver of Hawarden Bridge.

Table 9-34 LCA-34 River Dee Estuary – River Road

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-530 Deeside industrial
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park

LCA-34 Physical characteristics

Landform, landcover and pattern
Shotton Steelworks riverside and site of jetties, landing stages water settlement lagoons and water treatment works. Separated from estuary by a mixture of wall and levee. Pond areas have become silted up and have developed into scrub woodland and rough grassland. National Grid power lines cross the area.

LCA-34 Perceptual characteristics

Scale and appearance
Large scale and open aspect being located across the river from Wepre Gutter and the start of the funnel shaped estuary.
Tranquillity
River Road forms part of the road circulation network of Shotton Steelworks so there is infrequent access for occupation. Western edge is next to the A548, and the eastern edge is near to Hawarden Bridge, so the road and railway have an influence on parts of the area. River side is more tranquil.
Night-time changes
Significant light source influence from Shotton Steelworks.

LCA-34 Historic and cultural designations

Quay, landing stage and causeway registered assets. Adjacent to statutorily protected River Dee sites. No significant landscape or cultural designations.

LCA-34 Value and susceptibility to change

Non-designated former industrial area. Landscape value is judged as Low
There would be no direct impact due to the Scheme. Views towards River Dee Bridge are interrupted by Hawarden Bridge. The great majority of the area is at a long distance from the Scheme. The area is large scale and of open character and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-34 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 34 is judged as Negligible, and as such is filtered out from further assessment.

LCA-35: Sandycroft – Willow Brook Residential Area

9.3.21 Residential park next to Broughton Brook and the River Dee set within the Factory Road Industrial estate.

Table 9-35 LCA-35 Sandycroft – Willow Brook Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 MANCOT, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancos, Sandycroft and Pentre

LCA-35 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed and infilled land. Densely packed and clustered residential park, a small number of dwellings with small paddocks and River Row terrace of cottages.

LCA-35 Perceptual characteristics

Scale and appearance
Small scale and enclosed aspect. Track next to River Dee has more open aspect.
Tranquillity
Infrequent access for habitation to this small residential area.
Night-time changes
Significant light pollution influence from Factory Road industry. Historic record of The Dingle garden that was next to the Sandycroft Foundry.

LCA-35 Historic and cultural designations

Site of Sandycroft Quay and Shipyard. Next to statutorily protected River Dee canal. No significant cultural, nature conservation or landscape designation.

LCA-35 Value and susceptibility to change

Non-designated residential area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards River Dee Bridge are interrupted by industrial buildings and screen planting. It is at an intermediate distance from the Scheme. The area is small scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-35 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 35 is judged as Negligible, and as such is filtered out from further assessment.

LCA-36: Sandycroft Residential Area

9.3.22 Dense residential area, south-western boundary defined by Chester Road East, north-western boundary by the Chester Road industrial area, north-eastern boundary by the Chester and Holyhead railway line and south-eastern boundary by Station Road.

Table 9-36 LCA-36 Sandycroft Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-022 Mancot, Sandycroft and Pentre
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-048 Mancot, Sandycroft and Pentre

LCA-36 Physical characteristics

Landform, landcover and pattern
Lowland levels, reclaimed saltmarsh and infilled land. Village established to serve the Sandycroft Foundry and Engine Works. Nineteenth century Phoenix Street set at a diagonal to Chester Road East and Station Road, followed by gradual infilling of a square shaped settlement, initially along Wood Street, Watkin Street and North Street. Buildings a mixture of detached, semi-detached and terraced houses with many religious buildings and public houses for a relatively small settlement.

LCA-36 Perceptual characteristics

Scale and appearance
Small scale and enclosed by road, rail and industry. Predominantly red brick-built houses or red brick and render in a mixture of house styles.
Tranquillity
Frequent access for habitation and occupation. Chester Road East is a busy link between Queensferry and Broughton. Station Road is the main access into the Factory Road industrial area due to the size restriction at Chemistry Lane. Intermittent activity on railway line.
Night-time changes
Significantly influenced by neighbouring industrial areas.

LCA-36 Historic and cultural designations

Religious buildings recorded as National Monuments or heritage assets. Playing fields between settlement and railway line designated as Green Space. No significant cultural, nature conservation or landscape designation.

LCA-36 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are interrupted by Chester Road industrial areas and Pentre retail areas. It is at an intermediate distance from the Scheme. The area is small scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-36 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 36 is judged as Negligible, and as such is filtered out from further assessment.

LCA-37: Sealand – Garden City Residential Area

9.3.23 Located to the north-east of the River Dee. Residential area with some retail properties along Welsh Road. Queens Ferry Hotel is the sole building located at the historic core. The marshland reclaimed for agriculture has been developed in the C20 from the River Dee to the Sealand Embankment and another section developed from the embankment to the former Great Central Railway line.

Table 9-37 LCA-37 Sealand – Garden City Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-698 Sealand

LANDMAP Aspect Layer	LANDMAP Aspect Area
Landscape Habitats	FLNT-LH-021 Sealand industrial area
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park and 084 A55 and A494
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Estate, 047 Garden City Sealand Road and 131 A55 and A494

LCA-37 Physical characteristics

Landform, landcover and pattern
Lowland levels. Residential area with retail at core at the junction between Welsh Road and Farm Road/Foxes Lane. Housing estates are formally laid out following roads and consist of a mixture of detached, semi-detached and terraced properties.

LCA-37 Perceptual characteristics

Scale and appearance
Small scale with an enclosed aspect. Buildings are built with a mixture of materials and surface finishes which reflect the style of the period that they were constructed.
Tranquillity
Constant human access, with movement and noise influence from Welsh Road, Sealand Road and the A494.
Night-time changes
Light source generated from streetlights and individual properties, influenced by light from Queensferry town centre and Deeside Industrial Park.

LCA-37 Historic and cultural designations

Bascule Bridge is a Grade II listed building registered in the Sealand and Queensferry communities. Western end of Claremont Avenue is adjacent to statutorily protected River Dee canal. Institutional buildings and religious buildings recorded as national Monuments, as is Sealand Avenue housing estate provided for workers at Shotton Steelworks.

LCA-37 Value and susceptibility to change

Non-designated built-up area. Landscape value is judged as Low.
Garden City is immediately adjacent to the A494, and the Scheme site boundary would overlap the character area. Dwellings at the western end of Claremont Avenue have an indirect view of the existing Dee Bridge. The susceptibility to change is judged as Medium.

LCA-37 Sensitivity

Combining low value and medium susceptibility to change, the landscape sensitivity of LCA 37 is judged as Low.

LCA-38: Sealand – Northern Gateway Development Site

9.3.24 Strategic development site located on land associated with Shotton Steelworks, Sealand Bank Farm and Royal Air Force (RAF) Sealand to the north and north-west of the built-up areas of Garden City. The northern boundary is defined by the former Great Central Railway branch that connected Wrexham Junction to Liverpool Road Station in Chester. The railway is now part of the NCN 5 and the Chester Millennium Green Way. The eastern and south-eastern boundaries are defined by the A494 and Garden City. The western and south-western boundaries are defined by the River Dee. Redevelopment of the airfields has commenced with the construction of an arterial road and roundabout, large scale industrial buildings and housing estates.

Table 9-38 LCA-38 Sealand – Northern Gateway Development Site

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-698 Sealand
Landscape Habitats	FLNT-LH-023 Hawarden mosaic
Visual and Sensory	FLNT-VS-021 Garden City and Deeside Industrial Park and 076 Dee coastal levels
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-045 Garden City and Deeside Industrial Park and 120 Dee coastal levels

LCA-38 Physical characteristics

Landform, landcover and pattern
The area is lowland level farmland and a former airfield. Cover of predominantly amenity grassland and arable regularly cultivated farmland with some pasture for horses has been replaced by business and residential development. An open aspect to the River Dee retained as an area for surface water management and recreation. The large-scale areas are bounded by a mixture of tree belts, hedges with gaps, timber rail fence, stock proof fence and ditches. Shotwick Brook runs in a man-made channel from Chester Junction to Shotton Steelworks office buildings.

LCA-38 Perceptual characteristics

Scale and appearance
Development parcels defined by field pattern which itself was defined by the river, roads and railways and are of a large scale. The area retains an open character to the side nearest the river. Features of visual interest in views out of the site include Hawarden railway bridge and Bascule road bridge, and Shotton Steelworks office buildings.
Tranquillity
Noise and movement influences from B5441 Welsh Road, the A494 and Wrexham-Bidston railway and construction activities. The eastern embankment of the River Dee is part of the Burton Marsh Greenway that connects NCN 5 at Hawarden Bridge to NCN 563 at Bascule Bridge. This, combined with NCN 5/Chester Millennium Greenway, provides frequent pedestrian and cyclist movement. Vehicular access into construction sites is frequent.
Night-time changes
The area is affected by overspill from neighbouring areas. Internal light sources will increase as newly developed areas become occupied.

LCA-38 Historic and cultural designations

Shotton Steelworks offices are Grade II listed buildings, as are Hawarden Bridge and Bascule Bridge. The Shotton Steelworks Garden is a Grade II RHPG. Sited next to statutorily protected River Dee canal.

LCA-38 Value and susceptibility to change

Part of the character area is RHPG, and the area has historic connection to Shotton Steelworks. Landscape value judged as Medium.
There would be no direct impact due to the Scheme. Views towards Dee Bridge are either interrupted by buildings at Garden City or partially interrupted by the Bascule Bridge. The area is at a near to intermediate distance from the Scheme. The area is large scale, of open character and deemed to be of low scenic quality. This is a rapidly changing area. The susceptibility to change is judged as Low.

LCA-38 Sensitivity

Combining medium value and low susceptibility to change, the landscape sensitivity of LCA 38 is judged as Low.

LCA-39: Sealand Manor Settlement

9.3.25 Located within arable farmland to the south-west of Sealand Embankment, north-east of the River Dee and south-east of the A494. Extents are defined by arable land.

Table 9-39 LCA-39 Sealand Manor Settlement

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-698 Sealand
Landscape Habitats	FLNT-LH-021 Sealand industrial area
Visual and Sensory	FLNT-VS-076 Dee coastal levels
Historic Landscape	FLNT-HL-743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-119 Dee coastal levels

LCA-39 Physical characteristics

Landform, landcover and pattern
This is a built-up area of suburban semi-detached houses, with private gardens and communal parking, and amenity areas based on lowland and level reclaimed land. Estate roads provide access from Manor Road into the area.

LCA-39 Perceptual characteristics

Scale and appearance
The housing estate is formally laid out with elements of symmetry along the main access road that divides North Green and South Green. Views outwards are limited by boundary hedges and hedgerows. Where available, outward views are of the lowland agricultural areas and built-up areas beyond.
Tranquillity
Infrequent human access limited to residents and users of minor roads. Some influence of noise and movement from the A494 and the A548 Sealand Road.
Night-time changes
The area is affected by overspill from neighbouring areas. Light source from within the LCA derives from individual buildings.

LCA-39 Historic and cultural designations

The settlement is within a locally designated Green Barrier of Sealand – Cheshire Border. No significant cultural or nature conservation designation.

LCA-39 Value and susceptibility to change

Locally recognised status. Landscape value is judged as Medium.
There would be no direct impact due to the Scheme. Views towards Dee Bridge are available from the first floor of dwellings facing Manor Road. It is at a near to intermediate distance from the Scheme. The area is small scale, of enclosed character and deemed to be of low scenic quality. The susceptibility to change is judged as Medium.

LCA-39 Sensitivity

Combining medium value and medium susceptibility to change, the landscape sensitivity of LCA 39 is judged as Medium.

LCA-40: Shotton – Chester Road West and Chester Road East

9.3.26 Commercial centre from Hurlbutts Drive to Wepre Brook and bisected by the Wrexham-Bidston railway embankment. North-eastern boundary determined by the Chester and Holyhead railway line.

Table 9-40 LCA-40 Shotton – Chester Road West and Chester Road East

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-40 Physical characteristics

Landform, landcover and pattern
Linear high street with terraced housing, shops, retail units, institutional and religious buildings. Side streets and alleys provide access to other residential streets and businesses with good connectivity to the High Street.

LCA-40 Perceptual characteristics

Scale and appearance
Medium scale and enclosed. Outward views limited to those along the line of the main road. Ribbon development developed along the line of the road between Connah's Quay and Sandycroft. With the construction of the Shotton Steelworks and the Wrexham-Bidston railway line the area around Shotton Station developed quickly into a residential area of terraced housing. The area of playing fields and farmland between Queensferry and Shotton was infilled in the late twentieth century into a retail area.
Tranquillity
Busy main road, dominated by traffic.
Night-time changes
Streetlights and retail units are the main source of light pollution.

LCA-40 Historic and cultural designations

Religious buildings, railway stations and a 1950s garage are recorded as National Monuments. Other public houses, milestones and a 'ghost sign' are recorded heritage assets. Shotton Station recreation ground is designated as Green Space. No significant cultural, nature conservation or landscape designation.

LCA-40 Value and susceptibility to change

No significant cultural, nature conservation or landscape designations. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views towards Queensferry Junction are only available so the south-eastern side the Wrexham-Bidston railway embankment. The street is at an intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-40 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 40 is judged as Negligible, and as such is filtered out from further assessment.

LCA-41: Shotton – East Residential Area

9.3.27 Wedge shape residential area. Western boundary formed by Wrexham-Bidston railway line, northern boundary by B5129 Chester Road and eastern boundary by Shotton Lane, which connects Higher Shotton to the B5129.

Table 9-41 LCA-41 Shotton – East Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-41 Physical characteristics

Landform, landcover and pattern
Gently sloping lowland valley side. Cover is predominantly residential streets and institutional buildings with open space. Dwellings are a mixture of detached, semi-detached and terraced buildings. Gradual infilling of land between Shotton Lane and the railway. Previously site of brick works and farmland. Formal street layout

LCA-41 Perceptual characteristics

Scale and appearance
Medium scale and enclosed. Outward views of the large-scale building and power lines within the River Dee Canal industrial corridor available to streets at higher elevation at the south of the character area.
Tranquillity
Frequent access for habitation. Intermittent noise from railway line.
Night-time changes
Significant influence from commercial core of Shotton, which diminishes slightly the further south is travelled.

LCA-41 Historic and cultural designations

Religious buildings and site of brick works recorded as National Monuments. Shotton War Memorial listed as a heritage asset. Recreation ground classed as Green Space. No significant cultural, nature conservation or landscape designation.

LCA-41 Value and susceptibility to change

Non-designated landscape. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Intervisibility with Queensferry Junction and Dee Bridge are interrupted by neighbouring built up areas. The area is at an intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-41 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 41 is judged as Negligible, and as such is filtered out from further assessment.

LCA-42: Shotton – Higher Residential Area

9.3.28 Located to the west of Queensferry town centre and north-west of the A494. An extensive settlement of mid to late twentieth century housing with associated community facilities and open spaces. The southern boundary is defined by Aston

Road and the A494 corridor, the eastern boundary is defined by Queensferry town centre schools and retail areas and the northern and western boundaries are defined by the community boundaries of Shotton East and Aston which feature a similar arrangement of residential areas.

Table 9-42 LCA-42 Shotton – Higher Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-42 Physical characteristics

Landform, landcover and pattern
Gently undulating land with north-eastward aspect covered with built-up area of formally laid out suburban housing and associated community buildings developed along a network of estate roads. Modern housing has surrounded the historic core of the small village of Higher Shotton. Very few of the original village buildings survive, the narrow and winding banked lanes are a remnant of the past.

LCA-42 Perceptual characteristics

Scale and appearance
Mixture of buildings and amenity spaces of small and medium scale. The dense housing estates have an enclosed aspect for the most part, with the exception being streets at the outer edges with views across Queensferry and Aston Hall farmland.
Tranquillity
Area with frequent human access and influenced by neighbouring A494 corridor and Queensferry Town Centre.
Night-time changes
The area is a source of night-time lighting and is also influenced by neighbouring areas.

LCA-42 Historic and cultural designations

Amenity spaces within the built-up areas are locally designated as Green Spaces.

LCA-42 Value and susceptibility to change

Non-designated landscape. Landscape value is judged as Low.
There would be no direct impact due to the Scheme. Views of Queensferry Junction are available to streets facing Dee View and Aston Road at the edges of the area. The area at an intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Low.

LCA-42 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 42 is judged as Low.

LCA-43: Shotton –West Residential Area

9.3.29 Residential area. Western boundary formed by Wepre Brook and wooded valley, northern boundary by B5129 Chester Road, eastern boundary by Wrexham-Bidston railway line and southern boundary by Killins Lane.

Table 9-43 LCA-43 Shotton –West Residential Area

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area and 039 Northop Mosaic
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry

LCA-43 Physical characteristics

Landform, landcover and pattern
Gently sloping lowland valley side. Cover is predominantly residential streets and institutional buildings with open space. Dwellings are a mixture of detached, semi-detached and terraced buildings. Gradual infilling of land south of Wepre Bridge after construction of the Wrexham-Bidston railway line. Previously site of Shotton Hall Farm.

LCA-43 Perceptual characteristics

Scale and appearance
Medium scale and enclosed. Outward views of the large-scale building and power lines within the River Dee Canal industrial corridor available to streets aligned south-west to north-east.

Tranquillity
Frequent access for habitation. Intermittent noise from railway line.
Night-time changes
Significant influence from commercial core of Shotton, which diminishes slightly the further south is travelled.

LCA-43 Historic and cultural designations

Historic institutional buildings recorded as National Monuments. No visible remains of Shotton Hall Farm since the construction of Pippins Close/The Brambles estate. Southern portion registered as Green Barrier, which includes modern primary school, playing fields and nature reserve.

LCA-43 Value and susceptibility to change

Locally recognised as Green Barrier. No significant cultural or nature conservation designation. Landscape value judged as Medium.
There would be no direct impact due to the Scheme. Intervisibility with Queensferry Junction and Dee Bridge are interrupted by the Wrexham-Bidston railway line. The area is at an intermediate distance from the Scheme. The area is medium scale, enclosed and deemed to be of low scenic quality. The susceptibility to change is judged as Negligible.

LCA-43 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA 43 is judged as Low.

9.4 Transport Character Areas

9.4.1 This section is to be read in conjunction with Figure 9.9 (395318-RML-ZZ-XX-DR-L-9009).

LCA-44: A494 – Plough Lane Junction to Queensferry Roundabout

9.4.2 Located between the Wrexham-Bidston Railway crossing to the Chester and Holyhead Railway crossing. The road corridor cuts through the landscape dividing Aston from Lower Aston, Shotton from farmland in Aston Hall and Queensferry town centre from retail and industrial areas of Pentre and Sandycroft. The A494 follows roughly the alignment of the former Mold Road and Aston Colliery railway line. It is a strategic trade route between north-west England and north Wales.

Table 9-44 LCA-44 A494 – Plough Lane Junction to Queensferry Roundabout

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-084 A55 and A494
Historic Landscape	FLNT-HL-456 Connah's Quay
Cultural Landscape Services	FLNT-CLS-131 A55 and A494

LCA-44 Physical characteristics

Landform, landcover and pattern
The area is gently undulating to flat lowland with an enclosed aspect that is covered with a mixture of road surfacing, structures and roadside plantations. Together with its junctions and link roads, the A494 has facilitated retail, housing and industrial development in adjoining areas.

LCA-44 Perceptual characteristics

Scale and appearance
The road and associated elements have superimposed a large-scale corridor into a smaller scale landscape separating historic settlements.
Tranquillity
This LCA is the main source of noise and movement within the study area, with influence over neighbouring character areas.

Night-time changes
This LCA is a significant source of night-time light pollution within the study area, that has influence over neighbouring character areas.

LCA-44 Historic and cultural designations

There are no elements of historic or cultural interest remaining within this character area.

LCA-44 Value and susceptibility to change

Non-designated road transport corridor. Vital link between north Wales and north-west England. Landscape value is judged as Low.
A minor part of the area would be directly affected by the Scheme. This is a road corridor, and proposed changes would not alter the character of the area. The susceptibility to change is judged as Low.

LCA-44 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 44 is judged as Low.

LCA-45: A494 – Queensferry Roundabout to Deeside Park Junction

9.4.3 Located between the Chester and Holyhead Railway Bridge and the Deeside Park Junction with the A548. The road corridor cuts through the landscape dividing Queensferry town centre from the retail and industrial areas of Pentre and Sandycroft and Garden City from the Sealand lowland farmland plain. The A494 follows roughly the alignment of the former Aston Colliery railway line to the west of the River Dee and follows the outskirts of Garden City to the east of the river. It is a strategic trade route between north-west England and North Wales.

Table 9-45 LCA-45 A494 – Queensferry Roundabout to Deeside Park Junction

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-292 Dee Canal, 663 Queensferry-Mostyn Quay, 698 Sealand and 530 Deeside industrial
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area, 021 Sealand industrial area, 023 Hawarden mosaic and 025 Sealand grassland
Visual and Sensory	FLNT-VS-084 A55 and A494

LANDMAP Aspect Layer	LANDMAP Aspect Area
Historic Landscape	FLNT-HL-326 Dee Estuary, 456 Connah's Quay, 603 Sealand and 743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-131 A55 and A494

LCA-45 Physical characteristics

Landform, landcover and pattern
The area is flat lowland with an open aspect that is covered with a mixture of road surfacing, structures and roadside plantations. Together with its link roads and junctions, the A494 has facilitated retail, housing and industrial development in adjoining areas.

LCA-45 Perceptual characteristics

Scale and appearance
The road and associated elements have superimposed a large-scale corridor into an open and flat landscape.
Tranquillity
This LCA is the main source of noise and movement within the study area, with influence over neighbouring character areas.
Night-time changes
This LCA is a significant source of night-time light pollution within the study area, that has influence over neighbouring character areas.

LCA-45 Historic and cultural designations

There are no elements of historic or cultural interest within this LCA, although former sidings and branch lines once connected to historic collieries and riverside quays.

LCA-45 Value and susceptibility to change

Non-designated road transport corridor. Vital link between north Wales and north-west England. Crosses statutorily protected River Dee. Landscape value is judged as Low.
Directly affected by the Scheme. This is a road corridor, and proposed changes would not alter the character of the area. The susceptibility to change is judged as Low.

LCA-45 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 44 is judged as Low.

LCA-46: A494 Shotwick Interchange to M56 Junction 11

9.4.4 Located between Deeside Park Junction and the M56. Crosses rolling farmland and lowland plain character types and divides Shotwick from Saughall. Strategic route.

Table 9-46 LCA-46 A494 Shotwick Interchange to M56 Junction 11

CWCC Landscape Character Type	CWCC Landscape Character Area
Rolling farmland	RF6 Wirral
West lowland plain	WLP5 Guilden Sutton

LCA-46 Physical characteristics

Landform, landcover and pattern
The area is flat lowland with an open aspect that is covered with a mixture of road surfacing, structures and roadside plantations. The landscape it crosses is agricultural with urban fringe encroachment. Retail areas developed at junctions between A494/A540 and M56/A5117.

LCA-46 Perceptual characteristics

Scale and appearance
The road and associated elements have superimposed a large-scale corridor into an open and flat landscape.
Tranquillity
This LCA is the main source of noise and movement within the study area, with influence over neighbouring character areas.
Night-time changes
This LCA is a significant source of night-time light pollution within the study area, that has influence over neighbouring character areas.

LCA-46 Historic and cultural designations

Shotwick Park bisected by road corridor when A5117 was constructed, the alignment of which developed into the M56.

LCA-46 Value and susceptibility to change

Non-designated road transport corridor. Vital link between north Wales and north-west England. Landscape value is judged as Low.
No direct impact. This section of road infrastructure is at a long distance from the Scheme. The susceptibility to change is judged as Negligible.

LCA-46 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 46 is judged as Negligible, and as such is filtered out from further assessment.

LCA-47: A55/A494 Ewloe Interchange and St David's Junction

9.4.5 Road interchange between A55 and A494, including St David's Park junction and section to the Wrexham-Bidston railway crossing on Aston Hill.

Table 9-47 LCA-47 A55/A494 Ewloe Interchange and St David's Junction

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area and 039 Northop mosaic
Visual and Sensory	FLNT-VS-084 A55 and A494
Historic Landscape	FLNT-HL-213 Northop Hall and 846 Buckley and Ewloe
Cultural Landscape Services	FLNT-CLS-131 A55 and A494

LCA-47 Physical characteristics

Landform, landcover and pattern
Gently undulating lowland valley side. Broadly sinuous alignment set within embankments and cutting slopes covered with mixed woodland plantations or grassland and scrub.

LCA-47 Perceptual characteristics

Scale and appearance
The road and associated elements have superimposed a large-scale corridor into a smaller scale landscape separating historic settlements of Ewloe and Buckley.
Tranquillity
The main source of noise and movement, with influence over neighbouring character areas.
Night-time changes
A significant source of night-time light pollution, that has influence over neighbouring areas.

LCA-47 Historic and cultural designations

There are no elements of historic or cultural interest remaining within this character area.

LCA-47 Value and susceptibility to change

Non-designated road transport corridor. Vital link between north Wales and north-west England. Landscape value is judged as Low.
No direct impact. This section of road infrastructure is at a long distance from the Scheme. The susceptibility to change is judged as Negligible.

LCA-47 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 47 is judged as Negligible, and as such is filtered out from further assessment.

LCA-48: Chester and Holyhead Railway – Saltney Ferry to Shotton

9.4.6 Railway line, cutting and embankment slopes, stations and ancillary structures from Saltney Ferry to Shotton.

Table 9-48 LCA-48 Chester and Holyhead Railway – Saltney Ferry to Shotton

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay and 981 Saltney
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area and 025 Sealand grassland
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry, 022 Mancot Sandycroft and Pentre and 026 Dee coastal levels
Historic Landscape	FLNT-HL-456 Connah's Quay and 487 The Rakes
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry, 048 Mancot Sandycroft and Pentre and 121 Dee coastal levels

LCA-48 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed saltmarsh and infilled land. Straight railway line, passing Hawarden Airport, agriculture, industry and residential areas. At or near to grade from Saltney Ferry to Sandycroft, then gradually climbing to embankment at Pentre. Crosses over the A494 at Queensferry and continues on embankment before returning to at/near grade at Shotton station.

LCA-48 Perceptual characteristics

Scale and appearance
Linear. The track has an open aspect where it runs at grade through agricultural land. Where it passes through built-up areas, cutting and embankment slopes have been allowed to develop into semi-natural woodland which encloses the railway line.
Tranquillity
Intermittent disturbance from trains.
Night-time changes
Very little light source on railway track. Crosses through built-up areas with significant light sources.

LCA-48 Historic and cultural designations

Constructed in the mid-nineteenth century, Robert Stephenson the chief engineer. Saltney Ferry, Sandycroft and Queensferry stations no longer in use. Railway buildings and ancillary structures are recorded as National Monuments. No significant cultural, nature conservation or landscape designation.

LCA-48 Value and susceptibility to change

Non-designated rail transport corridor. Important link between UK and Ireland. Landscape value is judged as Low.
The railway crosses the A494 at Queensferry, and the railway embankment and bridge would be immediately adjacent to the proposed works. Susceptibility to change is judged as Low.

LCA-48 Sensitivity

Combining low value and low susceptibility to change, the landscape sensitivity of LCA 48 is judged as Low.

LCA-49: Chester and Holyhead Railway – Shotton to Flint

9.4.7 Railway line, cutting and embankment slopes, stations and ancillary structures from Shotton to Flint.

Table 9-49 LCA-49 Chester and Holyhead Railway – Shotton to Flint

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-014 Coastal slopes Mostyn to Ewloe and 020 Connah's Quay, Shotton and Queensferry

LANDMAP Aspect Layer	LANDMAP Aspect Area
Historic Landscape	FLNT-HL-456 Connah's Quay, 825 Leadbrook and 860 Flint
Cultural Landscape Services	FLNT-CLS-033 Coastal slopes Mostyn to Ewloe and 043 Connah's Quay, Shotton and Queensferry

LCA-49 Physical characteristics

Landform, landcover and pattern
Lowland valley side and flat reclaimed saltmarsh and infilled land. Passing town centre, industry, residential streets, power stations and energy infrastructure, pastoral farmland, estuary and then returning to residential and town centre in Flint. At or near grade in Shotton, gradually climbing onto embankment at Connah's Quay, then lowering into cutting at Kelsterton, in tunnel where it passes beneath the A548 and returning to at grade by Flint station.

LCA-49 Perceptual characteristics

Scale and appearance
Linear. Where it passes through built-up and undeveloped areas, cutting and embankment slopes have been allowed to develop into semi-natural woodland which encloses the railway line.
Tranquillity
Intermittent disturbance from trains.
Night-time changes
Very little light source on railway track. Crosses through built-up areas with significant light sources.

LCA-49 Historic and cultural designations

Constructed in the mid-nineteenth century, Robert Stephenson the chief engineer. Connah's Quay station no longer in use. Railway buildings and ancillary structures are recorded as National Monuments. No significant cultural, nature conservation or landscape designation.

LCA-49 Value and susceptibility to change

Non-designated rail transport corridor. Important link between UK and Ireland. Landscape value is judged as Low.
This section of the railway is at an intermediate to long distance from the Scheme. There would be no direct landscape impact. Susceptibility to change is judged as Negligible.

LCA-49 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 49 is judged as Negligible, and as such is filtered out from further assessment.

LCA-50: River Dee Canal – Saltney Ferry to Wepre Gutter

9.4.8 Located between the border at Saltney to the estuary at Wepre Gutter. A key and defining feature of Flintshire County. The river was canalised in the mid eighteenth century to preserve navigation to the Port of Chester following the gradual silting up of the natural course of the river. The 'New Cut' facilitated the reclamation of marshland for agriculture and simplified the carriage of coals from Aston Collieries to Chester. The embankments were constructed form the spoil material excavated in the trench. The new channel obstructed two historic low-water fords between Flintshire and Cheshire so two ferries were maintained, the upper ferry at Saltney and the lower Ferry at Queensferry.

Table 9-50 LCA-50 River Dee Canal – Saltney Ferry to Wepre Gutter

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-292 Dee Canal
Landscape Habitats	FLNT-LH-023 Hawarden mosaic and 025 Sealand grassland
Visual and Sensory	FLNT-VS-083 River Dee
Historic Landscape	FLNT-HL-326 Dee Estuary
Cultural Landscape Services	FLNT-CLS-130 River Dee

LCA-50 Physical characteristics

Landform, landcover and pattern
The channel is a simple and straight feature of inland water. Its excavation facilitated the reclamation of neighbouring marshland to agricultural use and then gradually to industrial, retail and residential development.

LCA-50 Perceptual characteristics

Scale and appearance
The river is contained by embankments and crossed by several road and rail bridges. It is a large-scale area of open character.
Tranquillity
The embankments are accessible and used as paths and cycleways, the river itself can still serve as a transport route. Crossing road and rail bridges are an additional source of noise and movement.
Night-time changes
There is little source of night-time light within the LCA, neighbouring built-up areas and road corridors have an influence on the river corridor. Bascule Bridge is floodlit.

LCA-50 Historic and cultural designations

The Hawarden Bridge and Bascule Bridge are Grade II listed buildings. There are the remains of many quays and landing stages and pill boxes of local historic interest. The river is statutorily protected for nature conservation as SSSI, SAC, SPA and Ramsar wetland.

LCA-50 Value and susceptibility to change

Internationally designated for nature conservation. Wales Coat Path and National Cycle Network routes use the river embankments. Landscape value is judged as High.
The Scheme would have a direct impact on the river channel and embankments. Susceptibility to change is judged as High.

LCA-50 Sensitivity

Combining high value and high susceptibility to change, the landscape sensitivity of LCA 50 is judged as High.

LCA-51: Wrexham-Bidston Railway – Hawarden to Shotton

9.4.9 Railway line, cutting and embankment slopes, stations and ancillary structures from Hawarden to Shotton.

Table 9-51 LCA-51 Wrexham-Bidston Railway – Hawarden to Shotton

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-196 Hawarden and 752 Northop-Buckley-Broughton
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area
Visual and Sensory	FLNT-VS-014 Coastal slopes Mostyn to Ewloe, 020 Connah's Quay, Shotton and Queensferry, 033 Hawarden, Ewloe, Burntwood and Drury, 072 Shotton farmland fringe and 084 A55 and A494
Historic Landscape	FLNT-HL-213 Northop Hall, 354 Hawarden, 456 Connah's Quay and 538 St Deiniol's Ash and Aston Hall
Cultural Landscape Services	FLNT-CLS-033 Coastal slopes Mostyn to Ewloe, 043 Connah's Quay, Shotton and Queensferry, 060 Hawarden, Ewloe, Burntwood and Drury, 107 Shotton farmland fringe and 131 A55 and A494

LCA-51 Physical characteristics

Landform, landcover and pattern
Lowland valley side. Sinuous railway line following settlement edges of Hawarden, Aston and Shotton. In cutting at Hawarden station, on embankment as it nears Aston Hall, crosses beneath the A494 in cutting then returns onto embankment through Shotton.

LCA-51 Perceptual characteristics

Scale and appearance
Linear. Where it passes through built-up and undeveloped areas, cutting and embankment slopes have been allowed to develop into semi-natural woodland which encloses the railway line.
Tranquillity
Trains are an intermittent source of sound and movement.
Night-time changes
There is little source of night-time light within the LCA, vegetation limits the influence of neighbouring built-up areas.

LCA-51 Historic and cultural designations

Constructed in the mid nineteenth century. This first section connected the coal fields at Wrexham to Connah's Quay. Railway stations and ancillary structures are recorded as National Monuments. No significant cultural, nature conservation or landscape designation.

LCA-51 Value and susceptibility to change

Non-designated rail transport corridor. Borderlands link between north-east Wales and the Wirral peninsula. Historically important freight line, that still serves Deeside Industrial Park and Padeswood Cement Works. Landscape value is judged as Low
This section of the railway is at an intermediate to long distance from the Scheme. There would be no direct landscape impact. Susceptibility to change is judged as Negligible.

LCA-51 Sensitivity

Combining low value and negligible susceptibility to change, the landscape sensitivity of LCA 51 is judged as Negligible, and as such is filtered out from further assessment.

LCA-52: Wrexham-Bidston Railway – Shotton to Birkenhead Junction

9.4.10 Railway line, cutting and embankment slopes, stations and ancillary structures from Shotton to Birkenhead Junction.

Table 9-52 LCA-52 Wrexham-Bidston Railway – Shotton to Birkenhead Junction

LANDMAP Aspect Layer	LANDMAP Aspect Area
Geological Landscape	FLNT-GL-292 Dee Canal, 530 Deeside industrial and 663 Queensferry-Mostyn Quay
Landscape Habitats	FLNT-LH-016 Connah's Quay urban area, 022 Dee Estuary mosaic and 023 Hawarden mosaic
Visual and Sensory	FLNT-VS-020 Connah's Quay, Shotton and Queensferry, 021 Garden City and Deeside Industrial Park, 078 Connah's Quay Dee frontage and 083 River Dee
Historic Landscape	FLNT-HL-326 Dee Estuary, 456 Connah's Quay and 743 Shotton Mills
Cultural Landscape Services	FLNT-CLS-043 Connah's Quay, Shotton and Queensferry, 045 Garden City and Deeside Industrial Park, 124 Connah's Quay Dee frontage and 129 River Dee

LCA-52 Physical characteristics

Landform, landcover and pattern
Flat lowland reclaimed saltmarsh and infilled land. Straight section of line connecting Shotton to Deeside Industrial Park and crossing the Dee at Hawarden Bridge. On embankment for majority of section.

LCA-52 Perceptual characteristics

Scale and appearance
Linear. Where it passes through built-up and undeveloped areas embankment slopes have been allowed to develop into semi-natural woodland which encloses the railway line. Where it crosses the Dee, the landscape opens out briefly, but outward views are interrupted by the railway parapet and bridge structure steelwork.
Tranquillity
Trains are an intermittent source of sound and movement.
Night-time changes
There is little source of night-time light within the LCA, vegetation limits the influence of neighbouring built-up areas.

LCA-52 Historic and cultural designations

Constructed in the late nineteenth century, this second section connected the docks at Birkenhead to a terminus at Hawarden Bridge where Shotton Steelworks was developed. Hawarden Bridge was constructed in the late nineteenth century and connected the line with the Wrexham Mold and Connah's Quay branch. The bridge is a Grade II listed building. The railway crosses the River Dee which is statutorily protected for its nature conservation.

LCA-52 Value and susceptibility to change

No significant landscape designations. Line crosses statutorily designated site for nature conservation. Landscape value is judged as Medium.

This section of the railway is at an intermediate from the Scheme. There would be no direct landscape impact. Susceptibility to change is judged as Negligible.

LCA-52 Sensitivity

Combining medium value and negligible susceptibility to change, the landscape sensitivity of LCA 52 is judged as Low.

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Technical Assessment Report

Chapter 9: Appendix D

Representative Viewpoints

395318 | RML-00-XX-RP-Z-9014

Stage Approval | Rev B | July 2025

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9. D. Representative Viewpoints Baseline Photographs

9.1 Lower Aston Hall Lane

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3095 6684	CH5 3EX	Hawarden, Aston	1.3 km	North-east

Viewpoint (February 2025):

From a public footpath (Hawarden path 34), connecting Lower Aston Hall Lane to Overlea Drive. It represents the view from gently undulating farmland with scattered rural settlement. A clipped hedge limits views north-eastward from the footpath. The photograph was taken from a gap in the hedge at a field gate. Lower Aston Hall Lane connects Aston to Hawarden.

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Views across the pastoral landscape are available where gaps in clipped hedges allow. The ground drops gently to the north-east in the direction of the River Dee. The foreground is made up of Aston Hall farmland with its regularly shaped fields bounded by hedges and stock-proof fences. The middle ground is made up of the retail areas of Queensferry and Pentre and the lowland agricultural plain with landmark Poplar trees to the east of the river. The background is made up of the Wirral sandstone ridge with areas of woodland and Congleton industrial areas. The view of the A494 is interrupted by mature trees within the grounds of Aston Hall, hedgerows alongside the Smithy Lane path and retail buildings of Pentre Trade Park. Road elements visible include the sign gantry at Garden City. The row of Poplar trees alongside Chemistry Lane are visible and filter the view of the SPEN warehouse. Other built elements include the electricity pylons in the foreground and also in the far distance.	**Susceptibility to change:** Low **Value attached to view:** Medium **Sensitivity of receptor:** Low

9.2 Hawarden Bridge

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3103 6929	CH5 1PY	Shotton, East	1.3 km	South-east
Viewpoint (February 2025): From NCN5 and Public Footpath West Saltney 12. Represents static views from flat lowland engineered landscape and transient views from users of regional designated routes. Photograph taken from ramp to Hawarden Bridge crossing.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View upriver along the Dee Canal, southern embankment and flood plain. Foreground to background is made up of parallel elements receding into the distance, To the right hand side is the southern embankment of the Dee Canal along which the Public Footpath West Saltney 8 runs. Next to the embankment is a low lying area liable to flood with National Grid Pylons and a secondary embankment. The Wales Coast Path follows this bank, and a series of WW2 pillboxes are positioned along it. Next is the riverbank and the canal and then the northern embankment and a row of Lombardy poplar trees at the edge of the Shotton Steelworks / Northern Gateway development site. Public Footpath Sealand 1 and Burton Marsh Greenway follow a path on the northern embankment. The focal point of the view is the Grade II listed Bascule Bridge. A494 road elements visible include the sign gantry at Garden City, the bridge deck and piers and high-sided traffic. Other noticeable elements include Queensferry Hotel, Bridge Villas, SPEN depot, Expressway Business Park and the Peckforton Hills in the far distance.	**Susceptibility to change:** Medium **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.3 Rowley's Drive

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3110 6900	CH5 1PY	Shotton, East	1.1 km	South-east
Viewpoint: From Rowley's drive near to Dee Bank Cottages. The view is representative of one experienced by users of minor roads and countryside workers from flat open lowland farmland. The view is open and uninterrupted.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View across the agricultural lowland available beneath tree canopies on Rowley's Drive. The ground is level. The southern embankment of the River Dee separates the farmland from the flood plain where National Grid pylons and powerlines are located. The foreground is made up of arable fields that are bounded by hedgerows with stock proof fences and rows of trees. Lines of Lombardy Poplar trees mark the northern embankment bank of the River Dee between Shotton Steelworks and Garden City. Also visible are the Hurlbutts Drive trees that are locally designated as TPO. Built elements in the view include the rooves of new dwellings at the Northern Gateway development site, Shotton Drain pumping station, the Grade II listed Bascule Bridge, power lines and pylons and the SPEN depot. Visible A494 road elements include the sign gantry at Garden City, some road lighting columns and roadside trees.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.4 Dee View

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3120 6976	CH5 1TQ	Shotton, Higher	0.5 km	East
Viewpoint: From an informal path in front of the dwelling 6 Dee View. It represents the view available to the dense residential area at the eastern edge of Higher Shotton. A clipped hedge limits views from ground floor rooms but view from the first floor overlook this hedge.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View across an area of unused and undeveloped ground towards the rear of Asda supermarket. Site of Aston County Secondary School. The foreground is made up of an area of scrub and rough grass with a seldom used path constructed through scrub, pedestrians tend to follow a direct line from Higher Shotton to Queensferry through an area of seasonally wet grassland. The middle ground is made up of the rear of the supermarket and its delivery and storage area. At the southern edge of the supermarket, Aston Road and the western approach to Queensferry Junction are visible. There is a hedgerow that partially screens Aston Road and the A494. The main plantation visible is located between the westbound carriageway and Daisybank Farm. Road elements visible include the road surface, traffic, signage and lighting columns. The rear of the supermarket is a major visual detractor but interrupts the view of Queensferry Junction, as is the significant amount of discarded litter.	**Susceptibility to change:** High **Value attached to view:** Low **Sensitivity of receptor:** Moderate

9.5 Chevron's Road footbridge

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3128 6785	CH5 1TP	Shotton, Higher	0.4 km	East-north-east
Viewpoint: From Chevron's Road footbridge above the road verge between the A494 and Aston Road. The view is open and uninterrupted by the bridge parapet. The transient view is representative of one available to users of public footpaths and is indirect to the direction of travel across the footbridge.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The view includes a portion of Queensferry Town Centre and the A494 Queensferry Junction. In the foreground from left to right in the view is the southern face of the Asda supermarket, Aston Road and a view of the The Cross and the Blessed Trinity Church, the A494 Queensferry Junction including the eastbound diverging slip road, traffic lights, roundabout and footbridge, the main line dual carriageway and the westbound merging slip road. Along the line of the A494 Makro at Pentre Retail Park can be seen. In the distant background the Wirral sandstone ridge and Congleton are visible. Electricity pylons and powerlines are other noticeable built elements. Road elements visible include road surface, traffic, signage, structures and lighting columns. Roadside plantations interrupt the view of the A494 to the east of Queensferry Roundabout.	**Susceptibility to change:** High **Value attached to view:** Low **Sensitivity of receptor:** Moderate

9.6 Clay Hill Farm

VIEWING POSITION				
OS Grid Ref: SJ 3149 6765	**Post Code:** CH5 2AQ	**Community:** Hawarden, Aston	**Distance from Scheme:** 0.5 km	**Direction of view:** North-east
Viewpoint: From Clay Lane at the junction with Public Footpath Hawarden 28 which follows the line of a long disused tramway/railway line that connected Aston Quay and Aston Hall Colliery railway to Mount Pleasant Brickworks in Buckley. The view is representative of a transient view available to users of Public Rights of Way and outdoor workers.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View across pastoral fields towards Queensferry Roundabout. The view is limited by field boundary hedges and roadside plantations. Visible elements include Gladstone cottages, residential caravan park at site of Boswell's Farm. The large building under construction is the paper mill facility at the airfields site in Garden City, which is part of the Northern Gateway strategic development site. Visible A494 road elements include roadside plantations, high-sided vehicles and a part of Queensferry Viaduct with cars visible.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.7 Queensferry town centre

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3162 6815	CH5 1SA	Queensferry	0.2 km	East-north-east
Viewpoint: From the roadside verge outside of the Grade II listed Queensferry War Memorial Institute. Representing the view available to pedestrians in Queensferry town centre and visitors to the community building. Views are limited by buildings alongside Chester Road West, Chester Road East, Mold Road and Station Road.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The view looks out across the junction between the B5129 and Mold Road towards The Cross in Queensferry, which is the junction of Mold Road/Station Road with Chester Road East/West. It is of a built-up area including retail properties with flats occupying first floors. The Blessed Trinity Church and residential areas of Glynne Street are also visible. There is an indirect view to the south of the A494 Queensferry Junction from this viewpoint location, but the view of the A494 east of here is interrupted by buildings.	**Susceptibility to change:** Low
	Value attached to view: Low
	Sensitivity of receptor: Low


KFC
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9.8 Old Hall Farm

VIEWING POSITION				
OS Grid Ref: SJ 3170 6884	**Post Code:** CH5 1SF	**Community:** Shotton, East	**Distance from Scheme:** 0.6 km	**Direction of view:** South-east
Viewpoint: From Public Footpath West Saltney 8, near to The Lodge and Old Hall Farm. The view is representative of one experienced by users of public footpaths and countryside workers from a flat and open lowland landscape.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: A broad and open view across the River Dee canal and flood plain. The foreground is made up of open grassland. A line of Lombardy Poplar trees and a hedgerow mark the northern embankment of the River Dee south of Shotton Steelworks. Built elements visible in the view include newly built north of the B5441 at Garden City, the Grade II listed Bascule Bridge, electricity pylons and power lines and the metal palisade fencing and evergreen planting that surround the Shotton Drain pumping station. Trees and shrubs screen the view of Bridge Villas. Visible components of the A494 include the sign gantry at Garden City, road lighting columns and roadside plantations next to the eastbound carriageway, northern bridge abutment and bridge pier and part of the deck with high-sided traffic visible. The Bascule Bridge interrupts the view of much of the A494 road bridge.	**Susceptibility to change:** High **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.9 Hawarden Cemetery

VIEWING POSITION				
OS Grid Ref: SJ 3169 6601	**Post Code:** CH5 3PX	**Community:** Hawarden, Mancot	**Distance from Scheme:** 1.9 km	**Direction of view:** North-north-east
Viewpoint: From part of cemetery south-east of Ash Lane. The view is one from gently sloping valley side and representative of one available to visitors to the cemetery and outdoor workers.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Broad and uninterrupted view overlooking the cemetery, of the River Dee's coastal slopes and industrial areas of the flat reclaimed saltmarsh. Visible elements include Shotton Steelworks, Deeside Industrial Park, developments at Northern Gateway site including paper mill under construction, Bascule Bridge, Pentre Trade Park, and Factory Road industrial area. Settlements visible include Shotton, Aston, Queensferry, Mancot, Pentre, and Garden City. Visible A494 elements include the sign gantry at Garden City, lighting columns and the roadside plantations. The section of A494 from RAF Sealand to Shotwick Interchange is also visible. The view of the bridge is screened by an accumulation of vegetation and roadside plantations that are difficult to distinguish at long distance.	**Susceptibility to change:** Medium **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.10 Plantation near to Pembroke Close

VIEWING POSITION				
OS Grid Ref: SJ 3178 6785	**Post Code:** CH5 2FE	**Community:** Queensferry	**Distance from Scheme:** <0.1 km	**Direction of view:** North-east
Viewpoint: From a footpath linking the series of streets branching from Dyfed Drive and Chester Road East to Queensferry town centre. It represents a static view available to a less densely populated area and a transient view for users of public open space of limited importance.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View along the path connecting the B5129 to Queensferry Subway and Queensferry town centre. Amenity trees next to the path have now reached maturity, they are backed by more densely planted earth mounds that provide a visual screen to the Queensferry Roundabout, the viaduct and retaining walls. During the summer an undergrowth of herbaceous plants contributes to a more solid visual barrier. During the winter, after the herbaceous growth has died down the screen is less effective, not helped by maintenance practices that involve the raising of tree canopy. There is a filtered view of the westbound diverge slip road and the westbound carriageway's retaining wall. Also the gable end of 1 Bridge Houses and the former Flintshire depot buildings are visible.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.11 Greenacres Farm

VIEWING POSITION				
OS Grid Ref: SJ 3185 6727	**Post Code:** CH5 2AR	**Community:** Hawarden, Mancot	**Distance from Scheme:** 0.6 km	**Direction of view:** North-north-east
Viewpoint: From Greenacres Farm Park at the junction between Colliery Lane and Public Footpath Hawarden 32. View is representative of a transient view available to users of Public Rights of Way of limited importance, outdoor workers and visitors to tourist attractions.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View across pastoral fields towards Pentre and Pentre Trade Park. The view is limited by field boundary hedgerows and residential buildings. Visible elements include Willow Park and Dyfed Drive residential areas, paper mill under construction at Northern Gateway site, Bascule Bridge and Makro retail unit, tanks at Queensferry sewage works, Pentre residential and industrial area, and the SPEN depot next to Chemistry Lane. No A494 road elements are visible, roadside trees are not easily distinguishable.	**Susceptibility to change:** Medium **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.12 Queen Street

VIEWING POSITION				
OS Grid Ref: SJ 3188 6814	**Post Code:** CH5 1TB	**Community:** Queensferry	**Distance from Scheme:** <0.1 km	**Direction of view:** East
Viewpoint: From the pavement outside of 21 Queen Street. It represents the view available to dense residential areas facing the A494. Unused buildings and the plantation on a false cutting limit the extent of the view.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Existing buildings and structures confine the field of view to a narrow arc. The ground is level. The foreground is made up of the disused Roberts & Williams Ltd building and yard with its surrounding boundary walls and fences. Towards the left-hand side of the view are Queen Street properties with even numbers and Dundas Street. At the right-hand side is the stopped-up path that connected Queen Street to the A494. High sided vehicles and lighting columns are visible on the A494, beyond which is the former Flintshire County Council depot building. Scottish Power 132kV power lines are other built elements visible.	**Susceptibility to change:** High **Value attached to view:** Low **Sensitivity of receptor:** Moderate

9.13 Dundas Street

VIEWING POSITION				
OS Grid Ref: SJ 3195 6819	**Post Code:** CH5 1SZ	**Community:** Queensferry	**Distance from Scheme:** <0.1 km	**Direction of view:** North-east
Viewpoint: From the pavement opposite 51 Dundas Street and at the gable end of 58 Queen Street. It represents the view available to pedestrians using Dundas Street and residential properties backing onto the A494.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Buildings along Dundas Street and Queen Street confine the field of view to a narrow arc. The ground is level. The foreground is made up of the southern end of Dundas Street which accesses alleys behind Queen Street and behind Dundas Street. The brick wall interrupts the view of cars and the road surface. In the middle ground of the view is the Chester and Holyhead railway bridge and vegetated embankment. Pentre Retail Park and the former Flintshire County Council depot are visible in a southward direction. Visible components of the A494 are high sided vehicles, lighting columns and enforcement cameras.	**Susceptibility to change:** High **Value attached to view:** Low **Sensitivity of receptor:** Moderate


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9.14 Northern Gateway development site

VIEWING POSITION				
OS Grid Ref: SJ 3228 6838	**Post Code:** CH5 1SF	**Community:** Sealand, West	**Distance from Scheme:** 0.4 km	**Direction of view:** South-south-east
Viewpoint: From a newly created amenity and surface water attenuation area adjacent to new build residential area. This viewpoint replaces the Farm Road viewpoint as the new development interrupts the westward view from the estate that was built to provide housing for Shotton Steel workers. Representative of the view available to users of local public open space of limited importance.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Open and uninterrupted view of swale and parkland between new build housing estate and the River Dee. The view terminates at Welsh Road in Garden City, where the Queensferry Road and Bascule Bridge are visible. Visible A494 road elements include the sign gantry at Garden City and lighting columns.	**Susceptibility to change:** Low
	Value attached to view: Medium
	Sensitivity of receptor: Low

9.15 Pentre Trade Park

VIEWING POSITION				
OS Grid Ref: SJ 3207 6787	**Post Code:** CH5 2DW	**Community:** Queensferry	**Distance from Scheme:** 0.1 km	**Direction of view:** North-north-east
Viewpoint: From the grassed area near to the entrance to Pentre Trade Park. The view is representative of the view available to retail workers and visitors to the trade park, users of main roads and cyclists using the National Cycle Network.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View along Queensferry Drain and across the car park of Makro wholesaler. The foreground is made up of clipped hedgerows and Queensferry Drain. Ornamental trees and shrubs within and around the car park filter the view of properties along Chester Road East. The disused dwellings at Bridge Houses and the former FCC depot are visible, as are the rooves of properties on Queen Street facing the A494. The wholesaler building interrupts the view of the railway embankment. Visible elements associated with the A494 are limited to lighting columns.	**Susceptibility to change:** Low **Value attached to view:** Low **Sensitivity of receptor:** Low

9.16 Station Road (Expressway Business Park)

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3204 6843	CH5 2TE	Queensferry	<0.1 km	East
Viewpoint: From a grassed area opposite the entrance to the builders' merchants in the business park. It represents the view available to office and retail workers and visitors to the business park.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The field of view available from the access road is limited by retail and office units and building material stock. The ground is level. The foreground is made up of the access road itself, building stock, security fences and areas of ornamental shrub planting. The hedgerow visible behind the Royal Mail building forms the boundary between the business park and the A494 and filters views of traffic. Notable features are the columnar Lombardy Poplars that are situated near to the eastbound carriageway as it approaches the River Dee bridge. Visible road elements are lighting columns and traffic. The view of traffic is filtered by roadside vegetation.	**Susceptibility to change:** Low **Value attached to view:** Low **Sensitivity of receptor:** Low


LANDSCAPING
HUWS GRAY

9.17 Pentre

VIEWING POSITION				
OS Grid Ref: SJ 3219 6777	**Post Code:** CH5 2AA	**Community:** Hawarden, Mancot	**Distance from Scheme:** 0.3 km	**Direction of view:** North-north-east
Viewpoint: From the road verge near to the gable end of 2 Mechanics Lane in Pentre. It represents the view from dwellings facing Chester Road East in a less densely populated area towards the retail park, and users of busy county roads.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: View across the B5129 towards Pentre Trade Park. The ground is flat. The foreground is made up of the county road. Through the gap in-between the retail unit and the amenity trees around the Makro car park can be seen the 1st floor of 21 Queen Street and the roof of the Co-operative Hall in the centre of Queen Street. The view of the A494 is interrupted by buildings within the trade park and the railway embankment. The row of Poplar trees alongside Chemistry Lane is visible behind the power station and a pylon to the east of this location.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low


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9.18 Bascule Bridge

VIEWING POSITION				
OS Grid Ref: SJ 3221 6866	**Post Code:** CH5 2TA	**Community:** Queensferry	**Distance from Scheme:** 0.1 km	**Direction of view:** South-east
Viewpoint: From the pavement on the bridge. The view is representative of one experienced by pedestrians crossing the bridge shared with traffic and an NCN route on the B5441 Station Road/Welsh Road. The Wales Coast Path crosses the Bascule Bridge. The view towards the A494 is indirect to the direction of travel. The view northward and downriver from Bascule Bridge are more interesting and features Hawarden Bridge, Flintshire Bridge, Connah's Quay Power Station and Shotton Steelworks. Hawarden Bridge provides another pedestrian crossing point shared with a cycle way.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: An open view of the River Dee Canal and River Dee bridge carrying the A494. The arc of visibility is limited by residential buildings in Garden City and retail and industrial units in Queensferry at Station Road. The Dee bridge limits views of the lowland plain upriver towards Chester. A glimpse of the remains of landing stages associated with Aston Quay is available. There is also a glimpse of Riverside Works buildings. National Grid power lines and pylons are a conspicuous feature of the canalised Dee. Visible components of the A494 apart from the bridge include the sign gantry at Garden City, lighting columns, traffic, environmental barrier at Garden City, roadside plantations and ornamental trees. The Lombardy Poplars are prominent features on the western side of the river as are the group of ornamental trees, predominantly Norway Maple, that filter the view of the beige coloured SPEN depot.	**Susceptibility to change:** High **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.19 Welsh Road

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3230 6878	CH5 2RA	Sealand, West	0.1 km	South-south-east
Viewpoint: From the pavement on Welsh Road to the east of the Bascule Bridge. The view is representative of a transient one experienced by road users including pedestrians and cyclists. The view to the A494 is indirect to the direction of travel.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: A view of the River Dee bridge interrupted by buildings and trees. The land is built up. The foreground is made up of garden and amenity space associated with the now closed Queens Ferry Hotel. Dwellings at Claremont Avenue and the eastern embankment of the River Dee combined with hedges and trees form a visual barrier that interrupts part of the view of the existing bridge. Overhead power lines are a conspicuous feature. Visible elements of the A494 include the Dee bridge, traffic, sign gantry, road lighting columns and ornamental trees at the western approach to the bridge.	**Susceptibility to change:** Low **Value attached to view:** Low **Sensitivity of receptor:** Low

9.20 Claremont Avenue / Wales Coast Path

VIEWING POSITION				
OS Grid Ref: SJ 3269 6887	**Post Code:** CH5 25N	**Community:** Sealand, West	**Distance from Scheme:** <0.1 km	**Direction of view:** South-east
Viewpoint: From the north embankment footpath in-between the Bascule and Dee bridges. The path is part of the Wales Coast Path and the Burton Marsh Greenway. The view is representative of a transient view for users of nationally promoted rights of way, and also one available from less densely populated areas.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Direct and uninterrupted view of the Dee Bridge, Dee Canal and embankments with the outfall of Queensferry drain and the sewage treatment plant. The view upriver is interrupted by the Dee Bridge and piers. A494 elements visible include bridge piles (visible at low tide), bridge piers, beams, deck and parapet, road traffic, sign gantry and lighting columns.	**Susceptibility to change:** High
	Value attached to view: Medium
	Sensitivity of receptor: Moderate

9.21 Chemistry Lane / Factory Road

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3249 6845	CH5 2QJ	Queensferry	<0.1 km	North
Viewpoint: From the junction of Chemistry Lane and Factory Road near to where Chemistry Lane passes beneath the Chester and Holyhead railway line. The view is representative of one experienced by users of public footpaths of limited importance (West Saltney paths 3, 6 and 15 meet here), road users and industrial workers.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The view is a narrow arc along Chemistry Lane confined by the boundaries to the sewage works and Factory Road industrial areas. A row of Black Poplar hybrid and Lombardy Poplar trees define the boundary to the sewage works and tend to lean southwards across Chemistry Lane. They are a distinctive feature of views from surrounding areas. The foreground is made up of soil mounds vegetated with grasses and herbaceous growth. The well-worn path follows the line of the railway that once connected Dundas Sidings to the former Queensferry Chemical Works. To the north of Chemistry Lane, sewage treatment and settling tanks can be seen, as can a row of Lombardy Poplar trees that are next to the A494. To the south of Chemistry Lane is the SPEN depot and the Grade II listed former Willans and Robinson factory.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.22 Wales Coast Path

VIEWING POSITION				
OS Grid Ref: SJ 3250 6859	**Post Code:** CH5 2SN	**Community:** Sealand, East	**Distance from Scheme:** 0 km	**Direction of view:** North-west
Viewpoint: From the Wales Coast Path and Burton Marsh Greenway, at the junction with a shared use path that connects the River Dee to Foxes Lane and Sealand Road. The broad and uninterrupted view is representative of a transient one experienced by users of nationally promoted rights of way and cyclists using the path for leisure or commuting.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: An open view of the River Dee Canal and River Dee bridge carrying the A494. The arc of visibility is only limited by the embankment of the A494. The existing A494 bridge interrupts the view of the Bascule Bridge and the lowland plain downriver towards the Dee flood plain and Queensferry. The numerous jetties and landing stages associated with Aston Quay are noticeable on the southern embankment of the river, as are the Riverside Works buildings, hauliers' yard and vehicles. Electricity power lines and pylons are a noticeable feature of the industrial areas of Queensferry. Visible components of the A494 apart from the bridge include the sign gantry on the eastern side, lighting columns, traffic, and distinctive Lombardy Poplars and ornamental trees at the western approaches to the bridge. Transport activities are infrequent on the river itself due to the silting up of the navigable channel.	**Susceptibility to change:** High **Value attached to view:** Medium **Sensitivity of receptor:** Moderate


Twitch

9.23 Aston Quay landing stage

VIEWING POSITION				
OS Grid Ref: SJ 3249 6845	**Post Code:** CH5 2DU	**Community:** Queensferry	**Distance from Scheme:** <0.1 km	**Direction of view:** North-north-west
Viewpoint: From an informal amenity area near to the remains of Aston Quay (near West Saltney path 7). The broad and uninterrupted view is representative of one experienced by users of public footpaths.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: An open view of the River Dee Canal and River Dee bridge carrying the A494. The arc of visibility is only limited by scrub woodland on the western bank of the river. The existing A494 bridge interrupts the view of the Bascule Bridge and the lowland plain downriver towards the Shotton Steelworks site. The numerous jetties and landing stages associated with Aston Quay are prominent in the foreground, as are some of the Riverside Works buildings. National Grid power lines and pylons are a conspicuous feature of the canalised Dee. Visible components of the A494 apart from the bridge include the sign gantry on the eastern side, lighting columns, traffic, environmental barrier and roadside plantations at Garden City. Transport activities are infrequent on the river itself.	**Susceptibility to change:** High **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.24 Ferrybank Farm

VIEWING POSITION				
OS Grid Ref: SJ 3278 6875	**Post Code:** CH5 2SH	**Community:** Sealand, East	**Distance from Scheme:** 0 km	**Direction of view:** West-south-west
Viewpoint: From a shared use path running parallel to the A494 that connects Foxes Lane to the Wales Coast Path/Burton Marsh Greenway along the Dee Canal northern embankment, near to Ferrybank Farm. Represents a transient view available to pedestrians and cyclists, outdoor workers and static view from less densely populated areas from flat lowland reclaimed saltmarsh.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Broad and uninterrupted view across arable land to the Dee Canal's northern embankment, Queensferry riverside and gently rising valley side to Hawarden and Ewloe. Visible elements include National Grid and SPEN overhead powerlines, light industrial units and haulage depot at Queensferry riverside. A494 road elements visible include the Dee bridge western abutment, deck and beams, upriver side parapet, sign gantry at Garden City, lighting columns, traffic, road embankment and drainage system, roadside plantations and planting areas. Tree and shrub planting along the westbound side embankment filters the view of traffic.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.25 Rector's Lane footbridge

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3286 6767	CH5 2DD	Queensferry, Pentre	0.6 km	North-north-west
Viewpoint: From a footbridge crossing the Chester and Holyhead railway line and Public Footpath Hawarden 5. Pedestrian connection between Rector's Lane/Chester Road industry and Factory Road industry. Representative of the view available to users of footpaths of limited importance within industrial areas in an area of flat lowland reclaimed saltmarsh.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Footbridge parapet and scrub growing on the bridge deck limit the view along the railway line. Visible elements include the semi-natural woodland that has developed alongside the railway, the railway line, exhaust stacks and tall buildings within the Chester Road industrial area and industrial buildings yards within the Factory Road industrial area. The SPEN depot is noticeable. No A494 road elements are visible.	**Susceptibility to change:** Low **Value attached to view:** Low **Sensitivity of receptor:** Low

9.26 Willans and Robinson landing stage

VIEWING POSITION				
OS Grid Ref:	**Post Code:**	**Community:**	**Distance from Scheme:**	**Direction of view:**
SJ 3286 6818	CH5 2QJ	Queensferry, Pentre	0.5 km	North-west
Viewpoint: From an informal amenity area and public footpath (West Saltney path 7), near to the remains of a landing stage associated with the Grade II listed factory buildings. The factory once manufactured specialist steels before becoming a munitions factory during World War I. The broad and uninterrupted view is representative of one experienced by users of public footpaths and workers at Factory Road.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: An open view of the River Dee Canal and River Dee bridge carrying the A494. The arc of visibility is only limited by the industrial estate on the western side of the river. The existing A494 bridge partially interrupts the view of the Bascule Bridge and the lowland plain downriver towards the Shotton Steelworks site and Deeside Industrial Park. Electricity power lines and pylons are a conspicuous feature of the canalised Dee and Deeside Industrial Park. Visible components of the A494 apart from the bridge include the sign gantry at Garden City, lighting columns, traffic, the environmental barrier and roadside plantations at Garden City. The view of traffic is filtered by vegetation on the south-facing embankment. There is a glimpse of the Lombardy Poplars at the western end of the Dee bridge. Transport activities are infrequent on the river itself.	**Susceptibility to change:** High **Value attached to view:** Medium **Sensitivity of receptor:** Moderate

9.27 Foxes Lane

VIEWING POSITION				
OS Grid Ref: SJ 3311 6862	**Post Code:** CH5 2SQ	**Community:** Sealand, East	**Distance from Scheme:** 0.2 km	**Direction of view:** West
Viewpoint: From the footpath that runs alongside Foxes Lane near to the junction with Manor Road. Representative of the view available to outdoor workers, users of footpaths of limited importance and road users in a flat open reclaimed saltmarsh landscape.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: Broad and uninterrupted view across arable land to the Dee Canal's northern embankment, Factory Road and Queensferry riverside industrial areas, the gently rising valley side to Hawarden and Northop with Moel Famau and the Clwydian Range visible on the distant horizon. Visible elements include National Grid and SPEN overhead powerlines, depots and industrial units and Ferrybank Farm screened by evergreen vegetation. A494 road elements visible include the Dee Bridge, sign gantry at Garden City, lighting columns, traffic and road embankment plantations. Tree and shrub planting along the westbound side embankment filters the view of traffic.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

9.28 Sealand Embankment

VIEWING POSITION				
OS Grid Ref: SJ 3322 6919	**Post Code:** CH5 2RJ	**Community:** Sealand, East	**Distance from Scheme:** 0.5 km	**Direction of view:** South-west
Viewpoint: From a shared use path running parallel to the A494, which connects Sealand Road to Foxes Lane. The viewpoint is located near to the boundary of 16 Sealand Road. It represents the view available to pedestrians and cyclists and residents of Sealand Road with an indirect view towards the Scheme.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The view looks over the reclaimed marshland used for agriculture towards the Factory Road industrial area in Queensferry. The ground is flat with the exception of man-made earthworks such as the Sealand embankment and the A494. Fields are bounded by a mixture of fences, hedges and drains. The shared use path runs next to the toe of the embankment of the A494's westbound carriageway. Road elements visible include traffic, safety barriers, signage, sign gantry and lighting columns. A view of the upper floors of the modern housing development at Maes Helyg in Garden City is available.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low


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9.29 Manor Road

VIEWING POSITION				
OS Grid Ref: SJ 3333 6872	**Post Code:** CH5 2SD	**Community:** Sealand, East	**Distance from Scheme:** 0.5 km	**Direction of view:** West-south-west
Viewpoint: From a field access gateway opposite 11 West Green on Manor Road. It represents the view from residents within less densely populated areas with northward aspects.				

SENSITIVITY OF VISUAL RECEPTOR	
Component of view: The view looks over the reclaimed marshland used for agriculture towards the Garden City. The ground is flat with the exception of man-made earthworks such as the A494. Fields are bounded by a mixture of fences, hedges and drains. Ground floor views are interrupted by a roadside hedge, but first floor rooms overlook the hedge and experience a view of the existing A494. Road elements visible include traffic, signage, sign gantry and lighting columns. The indirect view towards the Dee Bridge is partially interrupted by trees and shrubs within the grounds of Sealand Manor Farm and trees next to Manor Road. Overhead power lines and street lighting columns are other built features.	**Susceptibility to change:** Medium **Value attached to view:** Low **Sensitivity of receptor:** Low

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 9: Appendix E

Visual Effects

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9. E. Visual Effects

9.1 Visual Effects

9.1.1 This section is to be read in conjunction with Figures 9.11, 9.12 and 9.13 (395318-RML-ZZ-XX-DR-L-9011,9012,9013).

Table 9-1 LCA11 River Dee Reclaimed Agriculture, Sealand Manor

Reference	OSGB	Viewing position	Property type	Distance (m)
2SH	SJ 3285 6876	Ferrybank Farm, Foxes Lane, Sealand East	Detached, 3 storeys	20
Sensitivity of visual receptor				
Component of view. North-westward and south-eastward aspects. Direct view of existing road on embankment including Foxes Lane underbridge, safety barriers, traffic, signage, and lighting columns. View of road elements west of Foxes Lane is partially filtered by roadside vegetation. View of Riverside Works, Dee Bridge western approach embankment plantations and Lombardy poplar trees available from outdoor spaces. Long distant views towards Hawarden and Clwydian Range available from outdoor spaces.				
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate		

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Site compound - arable field to south-west of Ferry Bank Farm is being considered for temporary use as a construction site compound. There would be a view of site offices, welfare units, construction plant, construction vehicles and material stockpiles available from outdoor spaces. Access from the A494 westbound carriageway would be achieved through the construction of a temporary ramp which would cause the removal of embankment vegetation that screen a view of existing traffic. Preparatory works - removal of Lombardy poplars and plantations near to Riverside Works would be visible from outdoor spaces. Demolition of haulage depot buildings also visible from outdoor spaces. Earthworks - excavation of reprofiled drainage swale and alteration of embankment to accommodate shared use path ramp would be visible but could be interrupted by site compound buildings depending on the site layout. Structures - construction of replacement bridge to would be visible from outdoor spaces but could be screened by site compound buildings. Indirect view of sign gantry removal available from building and outdoor spaces.	Moderate	Short term	Near	Moderate adverse
Year of opening. There would be an indirect view of the replacement bridge, A494 embankment, traffic and lighting columns available from the building and outdoor spaces. Site of compound restored to agricultural use.	Minor	Medium term	Near	Moderate adverse
Design year. There would be an indirect view of the replacement bridge, A494 embankment, traffic, and lighting columns available from the building and outdoor spaces. Committed mitigation planting with landscape integration objectives would filter the view of road traffic.	Negligible	Long term	Near	Minor adverse

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Moderate adverse	Slight adverse

Reference	OSGB	Viewing position	Property type	Distance (m)
2SB	SJ 3315 6850	Sealand Manor Farm and The Paddock, Manor Road, Sealand East	Detached, 2 storeys	340
Sensitivity of visual receptor				
Component of view. North-westward and south-eastward aspects. Views towards A494 interrupted by substantial vegetation. View south-westward available from outdoor spaces feature level arable land, Pentre and Sandycroft industrial areas, and higher ground of Hawarden. Indirect view of River Dee bridge and Riverside Works available from outdoor spaces.				
Susceptibility to change. High	Value attached to view. Moderate	Visual sensitivity. Moderate		

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Site compound - arable field to west of Sealand Manor Farm are being considered for temporary use as site compound. View of site offices, welfare units, construction plant, construction vehicles and material stockpiles would be interrupted by substantial vegetation to all but views from outdoor spaces on western side of buildings. Preparatory works - removal of trees on western approach embankments of Dee Bridge haulage depot buildings visible from outdoor spaces. Earthworks – view of the excavation of reprofiled drainage swale and alteration of embankment could be available from outdoor spaces, depending on layout of site compound. Structures - view of replacement bridge construction. It would be a conspicuous feature of the view from outdoor spaces.	Minor	Short term	Near	Minor adverse
Year of opening. There would be a view of the replacement bridge, road traffic and lighting columns available from outdoor spaces.	Negligible	Medium term	Near	Minor adverse
Design year. There would be a view of the replacement bridge, road traffic and lighting columns available from outdoor spaces. Committed mitigation planting with landscape integration objectives would filter the view of traffic on the approaches to the bridge.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Slight adverse	Neutral

Table 9-2 LCA28 Queensferry, Chemistry Lane Industry and Sewage Works

Reference	OSGB	Viewing position	Property type	Distance (m)
2DU	SJ 3243 6841	1 to 22 Riverside Caravan Park, Riverside Way, Queensferry	Detached, 1 storey	35
Sensitivity of visual receptor				
Component of view. Earth bund surrounding caravan park screens views from ground level in all directions except for a gap in the bund at the entrance to the park. There is an indirect view of sign gantry and lighting columns. Roadside plantations of ornamental trees filter views of high sided vehicles.				
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate		

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Site compound – Land next to the caravan park is being considered for temporary use as a construction site compound. There could be a view of construction plant and material stockpiles, office/security/welfare buildings and hoarding panels to exclude public access to construction site. Preparatory works – plantation on western approach embankment to Dee Bridge removed. Riverside Works haulage depot buildings demolished. Queensferry Drain pumping station and electricity sub-station demolished after construction of replacement buildings/structures. Earthworks - excavation of new outfall to Queensferry Drain, in-filling of Aston Quay and construction of the replacement bridge western approach embankment visible from outdoor spaces. Ground preparation for the reconfiguration of Riverside Way. Structures - construction of replacement bridge filtered by hedgerow to outer face of bund surrounding caravan park. Construction of replacement pumping station and sub-station. Noise attenuation barrier installed to top of bridge approach embankment. Pavement - access to and junction with A494 along Riverside Way reconfigured for improved standard of visibility, deceleration and acceleration lanes.	Moderate	Short term	Near	Moderate adverse
Year of opening. View of westbound carriageway embankment and lighting columns available from outdoor spaces. View of traffic screened by noise barrier.	Minor	Medium term	Near	Moderate adverse
Design year. Planting with nature conservation and landscape integration objectives would filter the view of noise barrier on embankment, including traffic and lighting columns.	Negligible	Long term	Near	Minor adverse

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Moderate adverse	Slight adverse

Table 9-3 LCA29 Chester Road Industry and Pentre Trade Park

Reference	OSGB	Viewing position	Property type	Distance (m)
2AA	SJ 3191 6795	Drybridge Farm, Chester Road East, Mancot	Detached, 2 storeys	30
Sensitivity of visual receptor				
Component of view. Building frontage faces south-eastward. North-westward aspect has view towards A494 featuring Queensferry Autos disused garages, electricity sub-station, southern approaches to Queensferry Subway and A494 on embankment. Indirect view of Bridge Houses partially interrupted by vegetation. Road features visible include westbound diverging slip road, traffic, traffic camera and lighting columns. The view is partially interrupted by buildings and filtered by vegetation. View available from first floor as ground floor views are interrupted by an ornamental hedge.				
Susceptibility to change. High		Value attached to view. Low		Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Site compound – Former Flintshire Council amenity site and garages site being considered for temporary use as a construction site compound. Likely view of office and staff welfare unit buildings and staff parking. Hoarding panels to limit public access could interrupt view of activities. Preparatory work - view of removal of roadside vegetation and demolition of Bridge Houses to facilitate the excavation of a section of Queensferry Drain in open channel. The activities would open up a view of the A494 and an indirect view towards the Chester and Holyhead railway line. Earthworks - excavation to accommodate drain channel and shared use path along line of Chester Road East access into the former Flintshire depot. Pavement - reconfiguration of Chester Road East to provide maintenance access to Queensferry Drain and Queensferry Autos site. Structures - with the removal of the council depot, an indirect view of the railway bridge would be available, vegetation retained and protected on boundary between Makro and Chester Road East would filter the view. Construction vehicles and activity would be conspicuous elements in the view.	Moderate	Short term	Near	Moderate adverse
Year of opening. The road surface, safety barriers, traffic and lighting columns would be visible in views from first floor rooms as is the existing situation.	Negligible	Medium term	Near	Minor adverse
Design year. Planting with objective to enhance built environment would soften the view of hard elements such as road surfacing, kerbs, retaining walls and safety barriers. Planting with nature conservation objective to provide habitat connectivity between Chester Road East and the railway line would contribute to a visual filter of the road and road elements.	Negligible	Long term	Near	Minor adverse

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Neutral	Neutral

Table 9-4 LCA30 Queensferry, Factory Road Industry

Reference	OSGB	Viewing position	Property type	Distance (m)
2DD	SJ 3240 6801	Dundas Sidings, Factory Road, Pentre	Detached, 1 storey	40

Sensitivity of visual receptor		
Component of view. Buildings facing railway embankment and Chemistry Lane. Indirect view of row of Poplar trees at southern boundary to sewage works.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works – removal of group of small trees next to SPEN depot boundary fence. Construction activities and construction vehicles associated with the improvement of unsurfaced footpath surfaced shared use path would be conspicuous elements for a short period of time.	Minor	Short term	Near	Minor adverse
Year of opening. The shared use path would increase the built elements in the view from outdoor spaces. There would be a view of pedestrians and cyclists using the path from outdoor spaces.	Negligible	Medium term	Near	Negligible adverse
Design year. The shared use path would increase the built elements in the view from outdoor spaces. There would be a view of pedestrians and cyclists using the path from outdoor spaces.	Negligible	Long term	Near	Negligible adverse

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Neutral	Neutral

Table 9-5 LCA31 Queensferry, Station Road Industry

Reference	OSGB	Viewing position	Property type	Distance (m)
2TA	SJ 3215 6863	1 to 4 Bridge Villas, Station Road, Queensferry	Detached, 2 storeys	50

Sensitivity of visual receptor		
Component of view. South-eastward aspect facing Station Road and the A494. The view from ground floor is partially interrupted by a clipped ornamental hedge and evergreen trees. Road elements visible include sign gantry at Garden City, lighting columns and plantation trees. Views from first floor rooms overlooking hedge are of Station Road retail areas, Bascule Bridge and River Dee and include the Dee Bridge and the road on embankment, although this is partially interrupted by buildings.		
Susceptibility to change. High	Value attached to view. Moderate	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - the removal of plantations and Lombardy poplar trees next to the A494 would reveal views of the road and traffic. The works to regrade the western approach embankment would not begin until the replacement bridge is in place, traffic would be further from the viewer than is existing. Earthworks – the view of works to regrade the embankment to accommodate a widened shared use path to the west of the river, including the removal of the bridge abutment, would largely be interrupted by retail buildings. Structures - The existing River Dee bridge and the Garden City sign gantry would be removed in the view, but the activities associated with them would be visible.	Minor	Short term	Near	Minor adverse
Year of opening. A view of traffic, lighting columns and Dee Bridge would be available to first floor rooms, although the view of traffic would be partially interrupted by buildings. Ornamental hedge would interrupt the view of traffic and Dee Bridge from ground floor rooms and outdoor spaces.	Negligible	Medium term	Near	Minor adverse
Design year. Committed mitigation measures with visual screen objectives would interrupt the view of traffic at the western approach to the replacement bridge. The view of lighting columns, including those restored to the Dee bridge would be available.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Slight adverse	Neutral

Table 9-6 LCA32 Queensferry Town Centre

Reference	OSGB	Viewing position	Property type	Distance (m)
1TB.1	SJ 3184 6811	3 to 17 (odds), Queen Street, Queensferry	Terraced, 2 storeys	40

Sensitivity of visual receptor		
Component of view. South-eastward aspect towards A494. The direct view of the road surface and cars is interrupted by an engineered landform planted with ornamental trees. The landform interrupts the view from the ground floor of all road elements other than lighting columns. Views from first floor rooms partially overlook the landform but ornamental trees and shrubs filter the view of traffic. There is an indirect view of the road and red-brick boundary wall available to No 17 through a gap in-between Roberts & Williams building and the plantation.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - demolition of the depot building, which is a visual detractor, in order to facilitate the excavation of an open channel for Queensferry Drain. Construction vehicles would be conspicuous elements in the view.	Minor	Short term	Near	Minor adverse
Year of opening. High sided vehicles and light columns would be visible in an indirect view.	No change	Medium term	Near	No change
Design year. High sided vehicles and light columns would be visible in an indirect view.	Negligible	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Neutral	Neutral

Reference	OSGB	Viewing position	Property type	Distance (m)
1TB.2	SJ 3188 6814	21 to 41 (odds), Queen Street, Queensferry	Terraced 2 storey	45

Sensitivity of visual receptor		
Component of view. South-eastward aspect towards A494, former council depot and Makro wholesalers. Direct view of cars and road interrupted by walls that forms boundary between A494 and residential area. A view of high sided vehicles and lighting columns is partially interrupted by disused buildings and engineered landform. Views from first floor rooms overlook the boundary wall where disused building does not interrupt.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - demolition of the depot building, which is a visual detractor, in order to facilitate the excavation of an open channel for Queensferry Drain. Construction vehicles would be conspicuous elements in the view.	Moderate	Short term	Near	Moderate adverse
Year of opening. High sided vehicles and light columns would be visible.	No change	Medium term	Near	No change
Design year. High sided vehicles and light columns would be visible, although vehicles using the eastbound main line would be further away than existing. The existing eastbound carriageway would be rearranged as a merging slip road from Queensferry Junction and hard shoulder, which would reduce the frequency of high sided vehicles next to the boundary wall. Committed mitigation and enhancement planting would be noticeable benefits to the view.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Neutral	Neutral

Reference	OSGB	Viewing position	Property type	Distance (m)
1TB.3	SJ 3191 6818	43 to 61 (odds), Queen Street, Queensferry	Terraced 2 storeys	45

Sensitivity of visual receptor		
Component of view. South-eastward aspect with direct view of neighbouring houses (38 to 58 (evens)). Indirect view of high sided traffic and lighting columns available from Nos. 43 and 61 through gaps in-between Queens Street buildings and Dundas Street buildings. View of road surface and cars interrupted by wall and buildings.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Glimpse of construction activities, including demolition of former depot available from Nos 43 and 61, partially interrupted by buildings.	Negligible	Short term	Near	Negligible adverse
Year of opening. Indirect view of high sided vehicles and lighting columns available from Nos 43 and 61.	No change	Medium term	Near	No change
Design year. Indirect view of high sided vehicles and light columns available from Nos 43 to 61.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Neutral	Neutral

Reference	OSGB	Viewing position	Property type	Distance (m)
1TB.4	SJ 3192 6817	38 to 58 (evens), Queen Street, Queensferry	Terraced 2 storeys	25

Sensitivity of visual receptor

Component of view.

Frontage faces properties on opposite side of street. Rear of buildings have direct view of road, traffic and lighting columns, which is partially interrupted by a wall from ground floor rooms and outdoor spaces. View is towards former depot and Pentre Trade Park and Makro wholesaler. Indirect view of railway embankment.

Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory work - open and uninterrupted view of demolition of former depot and reduction in area of hard surfacing. Indirect view of removal of Bridge Houses. Earthworks - indirect view of excavation of open channel for Queensferry Drain. Construction vehicles and activities would be conspicuous elements in the view.	Moderate	Short term	Near	Moderate adverse
Year of opening. Road surface, safety barriers and cars would be visible to first floor rooms. High sided vehicles and lighting columns would be visible from ground floor, partially interrupted by brick wall.	No change	Medium term	Near	No change
Design year. Road surface, safety barriers and cars would be visible to first floor rooms. High sided vehicles and lighting columns visible from ground floor rooms and outdoor spaces. Committed mitigation and enhancement planting would be noticeable benefits to the view but would not mitigate the view of the A494 itself.	Negligible	Long term	Near	Negligible beneficial

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Neutral	Slight beneficial

Reference	OSGB	Viewing position	Property type	Distance (m)
1SZ.1	SJ 3193 6822	17 to 45 (odds), Dundas Street, Queensferry	Terraced, 2 storeys	55

Sensitivity of visual receptor		
Component of view. Building frontages face onto Dundas Street. Rear of properties face railway embankment. Indirect view of road interrupted by wall from ground floor views. High sided vehicles and lighting columns visible. Narrow arc of visibility available from street and from rear gardens. Indirect view of railway bridge.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - glimpse of construction activities, including demolition of former depot available in indirect view from street, partially interrupted by buildings.	Negligible	Short term	Near	Negligible adverse
Year of opening. Indirect view of high sided vehicles and lighting columns available from the street and rear gardens.	No change	Medium term	Near	No change
Design year. Indirect view of high sided vehicles and light columns available from street and rear of properties.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Neutral	Neutral	Neutral

Reference	OSGB	Viewing position	Property type	Distance (m)
1SZ.2	SJ 3197 6820	47 to 51 (odds), Dundas Street, Queensferry	Terraced, 2 storeys	15

Sensitivity of visual receptor

Component of view.

Properties at south-eastern end of Dundas Street next to A494. View from frontage overlook Queen Street rear gardens towards former depot and Bridge Houses and A494 Queensferry Junction. View from rear overlook Dundas Street rear gardens towards railway embankment and feature railway bridge and A494 to east of embankment including National Grid pylons. View of road, safety barriers, traffic and lighting columns available in both directions. Brick wall and outbuildings interrupt the view of cars and the road in views from ground floor and outdoor spaces.

Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - would include a view of the removal of the council depot which would increase the amount of the Makro wholesalers building visible. Earthworks - excavation of ground for Queensferry Drain open channel. Construction vehicles would be conspicuous elements in the view.	Moderate	Short term	Near	Moderate adverse
Year of opening. View of high sided vehicles and lighting columns available from street and gardens. Views from first floor would feature the road surface and cars in addition to high sided vehicles and lighting columns.	No change	Medium term	Near	No change
Design year. Road surface, safety barriers, vehicles and lighting columns would be visible from first floor rooms. From ground floor and outdoor spaces, view would be limited to high sided vehicles, railway bridge and lighting columns. Committed mitigation and enhancement planting would be noticeable benefits to the view and filter views of the wholesalers.	Negligible	Long term	Near	Negligible beneficial

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Neutral	Slight beneficial

Table 9-7 LCA37 Sealand, Garden City Residential Area

Reference	OSGB	Viewing position	Property type	Distance (m)
2SN.1	SJ 3239 6869	3 to 17 (odds), Claremont Avenue, Sealand West	Semi-detached 2 storeys	30
Sensitivity of visual receptor				
Component of view. Building frontages face Claremont Avenue. South-westward aspect from rear of properties offers a direct view of the River Dee bridge, including traffic and lighting columns. The view from ground floor rooms and outdoor spaces is partially interrupted by fences and vegetation.				
Susceptibility to change. High	Value attached to view. Moderate	Visual sensitivity. Moderate		

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - trees visible on the western side of the bridge would be removed to facilitate the regrading of the western approach embankment after the construction of the replacement bridge. Earthworks - the level of the replacement bridge would be higher than existing so that safety standards for forward visibility over the bridge can be achieved. Structures - The construction of the replacement would be partially interrupted by the existing bridge. Works to dismantle the existing bridge would be conspicuous in views. Lighting columns would be restored to the replacement bridge. Construction vehicles would be a conspicuous feature and construction activities would draw the viewer's attention. The bridge is the key feature of the Scheme.	Moderate	Short term	Near	Moderate adverse
Year of opening. The replacement bridge would be upriver of the existing bridge replacing it in the view. A view of traffic travelling on embankment west of the bridge would be uninterrupted for a short section. The new features and elements that would be added to the view are characteristic of the existing transport corridor.	Minor	Medium term	Near	Moderate adverse
Design year. The Scheme and committed mitigation measures would be noticeable and key features of the view. Planting at the western approaches to the bridge would screen the view of traffic. The view would be restored to one that is similar to the existing situation but with the reintroduction of lighting columns on the bridge.	Negligible	Long term	Near	Minor adverse

Significance of visual effect	Construction	Year of opening	Design year
	Moderate adverse	Moderate adverse	Slight adverse

Reference	OSGB	Viewing position	Property type	Distance (m)
2SN.2	SJ 3241 6871	46 to 64 (evens), Claremont Avenue, Sealand West	Semi-detached 2 storeys	25

Sensitivity of visual receptor		
Component of view. Southward and westward aspects facing towards A494 and River Dee. Southward view towards A494 partially interrupted by roadside plantation. Westward view towards river and Dee bridge interrupted by neighbouring buildings. Road elements visible include sign gantry and lighting columns. Where gaps in-between buildings allow, there is a glimpse of the Dee bridge and traffic. From outdoor spaces of Nos 46 to 50 there is also a view of ornamental trees at Riverside Works.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Preparatory works - trees visible on the western side of the bridge would be removed to facilitate the construction of western approach embankment to replacement bridge. Earthworks - the level of the replacement carriageway would be higher than existing so that safety standards for forward visibility over the bridge can be achieved. Existing vegetation would screen earthworks activities. Structures - replacement of the Dee bridge and restoration of lighting columns on bridge. Sign gantry would be removed. Existing buildings would screen bridge construction activities.	Negligible	Short term	Near	Negligible adverse
Year of opening. The replacement bridge would be upriver of the existing bridge replacing it in the view. A view of traffic would be interrupted by buildings. The features and elements that would be replaced in the view are characteristic of the existing transport corridor.	No change	Medium term	Near	No change

Design year. The replacement bridge would be upriver of the existing bridge replacing it in the view. A view of traffic would be interrupted by buildings. The features and elements that would be replaced in the view are characteristic of the existing transport corridor.	Negligible	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Neutral	Neutral

Reference	OSGB	Viewing position	Property type	Distance (m)
2SN.3	SJ 3256 6878	2 to 44 (evens), Claremont Avenue, Sealand West	Semi-detached 2 storeys	30

Sensitivity of visual receptor		
Component of view. Properties facing south-eastward with a direct view of the A494 on embankment. The view of cars is screened by a timber fence. The view of high sided vehicles, lighting columns and the sign gantry is filtered by ornamental planting on the embankment.		
Susceptibility to change. High	Value attached to view. Low	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. An indirect view of construction activities would be interrupted by the plantation. The sign gantry would be removed, and signage reconfigured to reflect the new road layout.	No change	Short term	Near	No change
Year of opening. The view would resemble the existing situation, the Scheme alignment would be shifted away from Claremont Avenue and the view of traffic would be interrupted by the embankment, plantation and a timber fence.	No change	Medium term	Near	No change
Design year. The view would resemble the existing situation, the Scheme alignment would be shifted away from Claremont Avenue and the view of traffic would be interrupted by the embankment, plantation and a timber fence.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Neutral	Neutral	Neutral

Table 9-8 LCA39 Sealand Manor Settlement

Reference	OSGB	Viewing position	Property type	Distance (m)
2SD	SJ 3327 6868	1 to 10, West Green, Sealand East	Semi-detached, 2 storeys	415

Sensitivity of visual receptor

Component of view.

View overlooking reclaimed marshland used as agriculture towards the Garden City. Ground floor views are interrupted by a roadside hedge, but first floor rooms overlook the hedge and experience a view of the existing A494. Road elements visible include traffic, signage, sign gantry and lighting columns. The indirect view towards the Dee bridge is partially interrupted by trees and shrubs within the grounds of Sealand Manor Farm and trees next to Manor Road. Overhead power lines and street lighting columns are other built features.

Susceptibility to change. High	Value attached to view. Moderate	Visual sensitivity. Moderate

Magnitude of visual impact (change in view)	Size/Scale	Duration	Distance	Magnitude
Construction. Site compound – part of arable field to west of Foxes Lane and near to the A494 is being considered for temporary use as a construction site compound. The roadside hedge along Manor Road would screen the view from ground floor rooms. From first floor rooms there would an indirect and partially interrupted view of site cabins and welfare units, construction vehicles and plant, and material. Preparatory works - works associated with the removal of ornamental trees at the western approaches to the Dee bridge, and the demolition of buildings at Riverside Works would be only partially visible from first floor rooms. Earthworks and Structures - a glimpse of the construction of the replacement bridge, and the alteration to the embankment to accommodate a ramp connecting the bridge with the local cycle and path network, would be available from first floor rooms. Garden City sign gantry would be removed.	Minor	Short term	Near	Minor adverse
Year of opening. There would be an indirect view of the replacement bridge, A494 embankment, traffic and lighting columns available from first floor rooms.	No change	Medium term	Near	No change
Design year. There would be an indirect view of the replacement bridge, A494 embankment, traffic, and lighting columns available from first floor rooms. Existing vegetation and committed mitigation planting on the embankment of the A494 would filter views of traffic.	No change	Long term	Near	No change

Significance of visual effect	Construction	Year of opening	Design year
	Slight adverse	Neutral	Neutral

Desk Based Assessment

A494 River Dee Bridge Replacement

Landsker Archaeology Ltd.

Desk Based Assessment

Project 2409

www.landskerarchaeology.co.uk

Contents

Frontispiece: Drone image of bridge from similar viewpoint to the 1962 aerial photograph

A494 River Dee Bridge Replacement
Desk Based Assessment

1. Summary

Mae'r asesiad desg hwn o wybodaeth archeolegol yn archwilio'r A494 arfaethedig i adnewyddu Pont Afon Dyfrdwy. Mae'r astudiaeth yn cynnwys yr holl wybodaeth sy'n hysbys am yr ardal ar hyd llwybr 2km y prosiect. Cynhaliwyd yr astudiaeth gyntaf yn 2019, tra bod y ddogfen hon yn astudiaeth atodol a gynhaliwyd yn 2025 i nodi unrhyw newidiadau yn y cyfamser.

Mae'r Cynllun ym mhlwyf Penarlâg, i'r dwyrain o dref Queensferry, Sir y Fflint. O fewn yr ardal astudiaeth 500m o led ar y naill ochr a'r llall i ffin y Cynllun, nodwyd 82 o asedau. O'r rhain, canfyddir 12 ased o fewn ffin y Cynllun ac mae'n bosibl y bydd effaith ffisegol arnynt. Mae'r 70 o asedau sy'n weddill y tu allan i'r Cynllun ac ni fyddant yn cael eu heffeithio.

This desk-based assessment of archaeological information examines the proposed A494 River Dee Bridge replacement. The study includes all the information known for the area along the 2km route of the project. The study was first undertaken in 2019, while this document is a supplemental study undertaken in 2025 to identify any changes in the intervening period.

The Scheme lies within the parish of Hawarden, to the east of the town of Queensferry, Flintshire. Within the 500m wide study area on either side of the Scheme boundary, 82 assets were identified. Of these, 12 assets are found within the Scheme boundary and are potentially physically impacted. The remaining 70 assets are outside the Scheme and will not be impacted.

2. Introduction

The Welsh Government has commissioned improvements to the A494 River Dee Bridge Crossing. This consists of a new bridge section over the Dee and improvements to allow greater traffic flow along the A494. The original study was undertaken in 2019, but the scheme was not taken forward at that time. It is now intended to develop the project further, so the studies undertaken for the project are being revised to ensure that they are still relevant.

Landsker Archaeology Ltd. undertook the original study for Richards, Moorehead and Laing Ltd. (RML) and was requested to revise the work in 2024. This is being undertaken as a supplemental desk-based assessment that uses the information in the original study (Landsker, 2019).

The overall aims of the project are to understand the nature of archaeological deposits on the site and determine the effect of the proposed development on that archaeological resource. The project was undertaken using the following sources:
A surface examination of the project by means of a walk-through survey.
An historic map regression to assist in understanding the development of the landscape.
Information was collected to establish the presence or absence, extent, condition, character, quality and date of any archaeological remains.

The project code is Landsker Archaeology P2409.

3. Field Procedures

The study area for historic asset collection was the land take and a corridor 500m beyond the boundary of the proposed Scheme. Where linear or historic landscape features extend beyond the 500m area, the study area was extended in order to provide sufficient context for the understanding of such features. Locations of sites identified in the 500m study area are listed in Table 3 and shown on Figure 2.

The site of the proposed improvement was visited for a walk-through survey in November 2024 with additional visits in February 2025 to specific locations to identify and record new features. Although the walk-through survey was focussed on the physical extent of the project, visits were made to adjacent locations of interest and to fully understand the setting of monuments outside the project limits. Locational information was collected using a Trimble R1 GNSS unit, capable of recording points of interest to an accuracy of one metre. This information was then uploaded to a GIS.

A series of drone images of the project area supplied by the project team were used to examine the area and compare with information from other aerial and mapping sources.

For designated heritage assets that could be affected as a result of significant change within their settings (e.g. scheduled monuments and listed buildings), the study area has included all such assets within a zone of 5km. The locations of Designated Sites are shown in Figure 3.

Full coverage of the regional (Clwyd Powys) HER for the main study area was acquired from Heneb: The Trust for Welsh Archaeological Planning Service. Details of defined Historic Landscape Character Areas, scheduled monuments, listed buildings and Registered Parks, Gardens and Landscapes of Special Historic Interest was obtained from Cadw and from published sources.

Limitations
All readily available data required for the assessment were acquired and examined. A key limitation is the presence or absence of buried archaeological remains within the Scheme boundary. Remote sensing methodologies (LiDAR and satellite imaging) were used in order to gain as much information as possible, although due to the nature of the area, were of limited value.

No intrusive archaeological investigation has been undertaken. The assessment of value of each site is based on documentary and site visit information. The actual value of each site may be re-assessed following further work that may give additional information.

4. Desk Based Assessment

The study used available printed and library material including historic map sources. Secondary sources such as published reports were used. Information was gathered for an area encompassing the Scheme defined limits and a wider zone up to 500m from either side of the Scheme boundary. Designated sites (scheduled monuments and listed buildings) were collected for a buffer zone up to 5km wide from the project boundaries.

The following sources were examined.

The regional Historic Environment Record (HER) held by Heneb: The Trust for Welsh Archaeology.
Lists at the National Monuments Record for Wales contained on the Coflein database.
Lists of Listed Buildings maintained by Cadw.
Lists of Scheduled Monuments maintained by Cadw.
Historic placenames recorded at the RCAHMW.
The NRW LANDMAP website information on Conservation Areas and Historic Landscape Areas.
Historic aerial photographs held by the Aerial Photographic Unit of the Welsh Government.
Lidar sources contained on the NRW portal https://datamap.govwales/maps/lidar-viewer/view#.

5. Results and Discussion

Baseline Environment
The archaeological and cultural heritage assets contained within the area covered by the route option is varied. Most assets are from the last two hundred years, with a range of sites in the area stretching back through the medieval to the prehistoric period. A Gazetteer of historical assets in the 500m study area is shown in Table 3. Table 2 shows the sites with an identified impact. The designated sites within 5km of the scheme are listed in Table 5 and shown on Figure 3. Historic placenames in the study area are listed in Table 6.

The known archaeological evidence with a brief historical baseline for the 5km zone around the Scheme is presented below. Details of sites identified in the 500m study area are included identified by a reference number in brackets, e.g. (Site 63).

Site location
The site covers the existing bridge over the River Dee, the slip road approaches to the bridge and the land around the inlet to the east of the bridge. The southwest limit of the scheme is at SJ 32240 68466, extending to the north side of the Dee at SJ 32449 68647, a distance of approximately 2km.

Geology
The site covers an existing bridge carrying the A494 across the River Dee as it flows northwest from Chester and opening into the Dee estuary. The project area starts at about SJ 32256 68493 on the southwest (Wales) side of the project to SJ 32441 68636 on the northeast (England) side.
The underlying bedrock geology of the area comprises mudstone with lenticular sandstones and conglomerates of the Warwickshire group. Etruria Formation - Mudstone, sandstone and conglomerate. Sedimentary bedrock formed between 319 and 308 million years ago during the Carboniferous period.
Superficial tidal flat deposits - clay, silt and sand. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.
https://geologyviewer.bgs.ac.uk/.

Landscape
The NRW LANDMAP Historic Landscape Polygon.shp, (accessed at smnr-nrw.hub.arcgis.com/datasets) gives the following information for the 500m study area:

Sealand FLNTHL 603

Flat and low-lying fieldscapes on the northern side of the Dee Estuary, below 10 metres above sea level, systematically reclaimed from former salt marsh between 1749 and 1916, following the construction of the New Cut of the river Dee in 1737.

Dee Estuary FLNTHL 326
Water, coastal marshland and sands below mean high water preserving ancient land surfaces dating from the later prehistoric period and overlying later marine and estuarine sediments, both of high palaeoenvironmental and archaeological significance.

Connah's Quay FLNTHL 456
Extensive, low-lying modern settlement and manufacturing complexes at Connah's Quay, Shotton and Queensferry and some straight-sided fields, on the southern side of the canalized river Dee, between a height of 0-50 metres above sea-level. The narrow strip along the Dee represents land drained and reclaimed in the post-medieval period.

Historic Background

Prehistoric (to AD 43)
There is surprisingly little known regarding the earlier prehistoric periods within the study area. Recorded examples of Mesolithic material have been found at Rhyl and Rhuddlan to the north of the area as well as on the northern coast of the Wirral. The reconstructed palaeoenvironmental data suggests that the Dee estuary was a deep river valley before the rise in sea levels in the early post-glacial period. This area would have been attractive habitat for exploitation of seasonal resources. The area was inhabited during the Iron Age by the Deceangli tribe, and later by the Romans.

Roman (AD 43 to AD 410)
Roman remains are limited to the settlement at Pentre Bridge (now 'Pentre Ffwrndan,' east of Flint) that appears to be associated with lead mining on Halkyn Mountain. The A548 road may also have possible origins in this period. The excavations at Pentre Bridge uncovered high status buildings, lead working industry remains and extensive settlement evidence as well as a cemetery. A Roman port is presumed to be present at Flint although this has not been located. There was a large Roman presence at Chester with several roads extending from there, including those passing through Flintshire.

Early Medieval (410 to 1066)
Aside from the presence of Offa's Dyke to the west of Northop and Ewloe, evidence of early medieval activity is scarce. Certain ecclesiastical sites are purported to originate in this period, although physical evidence is lacking. Place name analysis of settlements and historic map regression of early church boundaries suggests that some areas such as Hawarden originated in this period.

Medieval (1066 to 1500)
Several of the towns in the wider area are documented during this period. Flint itself dates to the mid-13th century and originally functioned as a campaign base for Edward I and as a result, had extensive defensive arrangements. The towns of Northop and Hawarden all appeared during the medieval period, while Ewloe and Hawarden both have castles dating to this period. The area saw much unrest and conflict as it is located in the borderlands between Wales and England. Wepre Woods, close to Ewloe Castle, was the scene of an ambush and battle where the Welsh forces of Owain Gwynedd and the invading forces of Henry II clashed in 1157.

Although the Welsh forces won that battle, the English were ultimately victorious, which led to the loss of Welsh independence.

Post-medieval (1500 to 1900)
The area saw a rapid expansion during the post-medieval period. Expansion during this period was linked primarily to the coal and lead mining industries and led to a movement of people into the area. A wide variety of denominations are represented by the churches and chapels in the study area. Many surviving structures illustrate this multitude of ecclesiastical sites. Further examples of the built heritage show the types of industrial processes occurring within this part of the Dee Estuary. Iron and steel works, textile mills and alkali works are all present in the study area, although these generally date to the later post mediaeval. A number of transport-related sites are present, mainly connected to the railway, which allowed the movement of raw materials and finished goods. The main development in the landscape was the canalisation of the River Dee. The new canal portion opened for river traffic in 1737, which allowed large areas of former marshland to be reclaimed in the Shotton and Queensferry areas.

Modern (1900 to present)
Sites dating from the modern period generally comprise examples of built heritage and infrastructure constructed in the early 20th century. These include a number of chapels, commercial buildings and workers' housing. There are several military and defensive sites located within this area of Flintshire. These comprise pillboxes and an airfield with extant World War I and World War II built heritage at RAF Sealand. Of relevance to the project is the construction of bridges across the Dee. The original Queen's Ferry was replaced by the Victoria Jubilee Bridge in 1899. This was a retracting drawbridge to allow vessels to pass. Soon it became too small for the traffic, so was replaced by the double bascule bridge in 1924. The buttresses of the original bridge can be seen on either side of the river downstream from the bascule bridge. The modern bridge carrying the A494 was built in 1960-2.

6. Results of Supplemental Work

In the period between the preparation of the initial desk-based assessment in 2019 and the revised study in 2024, further information has been obtained on the sites relating to World War 2 in the area. Additional information in the HER entry for Site 26 (CPAT 34256), a pillbox west of the Blue Bridge (Site 33) indicates a row of concrete blocks. The suggestion is that this was part of a series of anti-tank cubes. This possibility changed the perception of the concrete blocks found on the line of the proposed works described as Site 51, Aston Quay Landing Stage III. The four concrete blocks shown in the 1962 aerial photograph (Figure 18) could also be seen as World War II anti-tank cubes. When examined in 2019, they were thought to be either associated with the landing stage or as some product of the bridge construction.

A further visit to the area to examine these features was made in February 2025. Site 26, the pillbox, was visited and the blocks at Site 51. The blocks were measured, and the dimensions were compared with known World War 2 examples. The results are shown in Table 1.

Table 1. Dimensions in cm of concrete blocks

Site	Width	Depth	Height	Source
Site 26	50	60	90	DBA
Site 26	50	50	30	DBA
Site 26	50	60	40	DBA
Site 26	50	50	40	DBA
Site 51	170	170	120	DBA

Fairbourne	150	150	170	Coflein NPRN 270354
Bwlchgylfin	152	152	152	GAT PRN 29738

Only one block can now be seen at Site 51. The two pale blocks close to the riverbank have gone. The location of the third pale block lies in a fenced-off, overgrown area, is not visible and possibly also gone. Photographs taken in February 2019 at a time of low vegetation cover showed no concrete blocks within the fenced-off and overgrown area.

A re-examination of the 1962 aerial photograph (Figure 18) suggests that the surviving block can be seen as a grey rectangle close to the riverbank. This lies in the same orientation relative to the bank as the present-day block. The three pale blocks are all much larger than the grey block, possibly 2.5m in each dimension. They are therefore, much larger than typical known World War II anti-tank cubes. Their pale hue may indicate that they have been freshly constructed, so are most likely related to bridge construction and are awaiting removal at the end of construction. If this is so, then the existing dark grey block is most likely some form of mounting for the tramway heading to the landing stage.

The blocks leading south from the pillbox (Site 26) were all much smaller than other known anti-tank cubes (Figure 30). The standard dimensions of anti-tank cubes created in the 1940s ranged from 1.07m (3ft 6 inches) to 1.53m (5ft) Lowry (1996). It is likely that the small concrete blocks behind the pillbox originate as some form of mounting or sleepers for the tramway that came down to the landing stage (Site 27). Possibly they were used to create an additional line of protection on the flank of the pillbox. This is an unlikely area for a tank-borne assault, so the deliberate creation of anti-tank cubes here is unlikely. Examination of the RAF photographs of the area after the war (RAF 1947, 1948, 1951, 1957) show no evidence for lines of other anti-tank cubes at either Site 26 or 51. Close examination of the aerial images around Site 51 show no clear indication of the concrete blocks in question (figures 8-12). The conclusion must be that these blocks are associated with the operation of the jetty, Site 51.

Another element of the updated HER information is the identification of a pillbox by the ‘Blue Bridge’ (CPAT 121200), recorded as Site 73 in this report. There is no physical evidence for a pillbox in this area and the aerial photographs for the post-war period show no sign of a pillbox, despite other pillboxes being clearly visible along the south bank of the Dee (Figures 8-12). The 1871 Ordnance Survey map (Figure 5) shows this area as an inlet of the river without a formal riverbank being established, before the construction of the Victoria Jubilee bridge, (Site 33). Examination of the 1947 and 1948 RAF vertical photographs for this area (Figures 8 and 9) show the area east of the Blue Bridge (Site 31) to be a very low elevation only just above the level of the river and containing a series of parallel rectangular bays, possibly for launching boats that may have been assembled in the Aston Quay shipyard (Site 46). This low-lying area with no commanding views of the area does not seem to be a suitable strategic location for a pillbox.

There is, however, a further pillbox some 350m to the east on a raised section of riverbank (Site 79). This is clearly visible in the RAF photographs (Figures 8-12) as a polygonal structure with an enclosure to the rear and is of the same type as the other pillboxes along the south bank of the River Dee. The pillbox is no longer visible and has probably been destroyed. The latest date where the feature is visible was on the Ordnance Survey 1959 aerial photograph (Figure 12). It is suggested that this pillbox is the location of the one reported as being by the ‘Blue Bridge.’

In the area of Site 51 Aston Quay Landing Stage III, four concrete blocks are visible at low tide (Figure 23, 26) together with a timber post in the concrete embankment aligned with the grey

concrete block (Figures 18, 20, 21, 22, 23, 24, 25). These will have formed the base of the loading quay (Site 51). This structure was mostly demolished during the construction of the existing A494 bridge in 1961-62. It is, however, still partly visible in Figure 17, which must be around the same period of time as the aerial view (Figure 18). The final remains of this landing stage will be removed by construction of the new bridge.

The RAF 1947 and 1948 aerial photographs (Figures 8 & 9) are particularly useful for identification of activity on the south bank of the River Dee. This is due to the low angle of the winter sun at the time of photography. These show that the railway leading to the quay (Site 49) lies on an elevated trackway with what appear to be vertical sides. West of this is the possible ship launching are which was used as an area to dump material from the 1951 aerial photograph (Figure 10) onwards.

The tramway leading to the quay (Site 51) also appears to lie on a raised platform with vertical sides, certainly on the west side, while the east is the wider area that contained the Aston Quay Building (Site 43) and the Aston Quay Port (Site 48). Structure can be made out on the RAF photographs in 1947, 1948 and 1951, but in the RAF 1957 and OS 1959 photographs only a rectangular pale area is visible, which is also visible in the 1962 aerial photograph. This is interpreted as the concrete foundation of a removed building. It may still be present on site seen in Figure 21, possibly glimpsed through the fence and the vegetation.

Physical impact
Within the 500m study area on either side of the Scheme boundary, 82 assets were identified. Of these, 10 assets are found within the Scheme boundary and are potentially physically impacted, while there are 7 outside the Scheme boundary that may have an impact on their setting. The remaining 65 assets are outside the Scheme and should not be impacted.

There is a high potential that intrusive works on either option may uncover previously unrecognised archaeological deposits. The potential for previously unrecorded archaeology has not been quantified at this stage, but is likely to be adverse.

7. Conclusions

The desk-based assessment has identified a number of sites within the study area. These are nearly exclusively of the nineteenth century, or later in date.

The primary features in the study area relate to road and ferry crossings across the River Dee. There are many quays, harbour fittings and rail links to export coal by ship from the coal mines inland of the riverbank.
.
The renewal of the Dee Bridge will possibly impact on a number of features. The relate to the maritime and coal shipping trade of the area from the 1860's to the 1920's. The nature of the area and surviving evidence of industrial activity have been changed dramatically by the regeneration of the area and construction of the A494 and Dee Bridge around 1960.

Due to the presence of trees and fences, it is not possible to undertake further pre-construction work in the area. It is proposed that a programme of recording is undertaken during the initial site clearance phase of work and maintain a watching brief on soil disturbing operations. The scale and extent of this programme of work will need to be agreed with Heneb: The Trust for

Welsh Archaeology Archaeological Planning. A summary list of suggested actions is presented in Table 2. Further detail for these sites is given in Table 4.

Table 2. Summary of impacted sites and suggested further action.

ID	Name	Impact
11	Aston Hall Colliery Railway	Monitoring during construction watching brief
37	Aston Quay Weighbridge	Monitoring during construction watching brief
43	Aston Quay Building	Monitoring during construction watching brief
45	Queensferry Chapel	Monitoring during construction watching brief
46	Queensferry Shipyard II	Limited strip and record during site clearance
47	Queensferry Chemical Works Railway	Monitoring during construction watching brief
48	Aston Quay; port	Limited strip and record during site clearance
49	Aston Railway	Monitoring during construction watching brief
50	Aston Quay Landing Stage IV	Monitoring during construction watching brief
51	Aston Quay Landing Stage III	Record above ground features. Limited strip and record during site clearance
53	Aston Quay Landing Stage V	Monitoring during construction watching brief
75	Sluice	Photographic recording of feature during site clearance

8. References

Published sources:

CIfA, *Code of Conduct* (October 2022)

CIfA, *Standard and Guidance for historic environment desk-based assessment (*October 2020).

CIfA, *Standard and Guidance for the archaeological investigation and recording of standing buildings or structures* (October 2022).

CIfA, 2024. *Toolkit for Managing Digital Data (Dig Digital),* version 1.2 (June 2024).

CIfA, 2020. *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (October 2020).

English Heritage, 1991. *Management of Archaeological Projects*.

Heneb: The Trust for Welsh Archaeology, 2024. *Guidance for the Submission of Data to the Heneb Historic Environment Record (HER), v*ersion 4.1. December 2024.

Jones, N. 2017. Roman Deeside. Archaeology in Wales. Vol **56**, p 125-127.

Jones, N.W., 2006, *Ports and Harbours in North-East Wales: Interim Project Report.* CPAT Report No 769.

Jones, N.W. & Owen, W.J., 2007. *Ports and Harbours in North-east Wales: Final Project Report*. CPAT Report No 837.

Mott Hay and Anderson, 1962. *Queensferry By-Pass and Bridge (Flintshire).*

National Panel for Archaeological Archives in Wales, 2019. *National Standard and Guidance for Collecting and Depositing Archaeological Archives in Wales*. 2019.

Royal Commission on the Ancient and Historical Monuments of Wales, 2015. *RCAHMW Guidelines for Digital Archives, version 1.*

Walters, M., 1992. *An Archaeological Assessment of the A494 Improvement Scheme, Drome Corner to Ewloe, Clwyd*. CPAT Report No 35.

Archive material

Hawarden Tithe Map and Apportionment, 1841. The National Library of Wales, Tithe Maps of Wales.

OS, 1871. Flintshire X surveyed 1869. Published 1871. National Library Scotland https://maps.nls.uk/.

OS, 1900. Flintshire X SE Revised 1897 to 1898. Published 1900. National Library Scotland https://maps.nls.uk/.
OS, 1911. Flintshire X.15 Revised 1909. Published 1911. National Library Scotland https://maps.nls.uk/.
OS, 1959. 5903 OS 05 59 064 013 14 June 1959. Aerial Photographs Unit, Welsh Government.
RAF, 1947. 4706 RAF CPEUK 1935 2012 17 January 1947. Aerial Photographs Unit, Welsh Government.
RAF, 1948. 4824 RAF CPE (B) UK 19 5002 26 April 1948. Aerial Photographs Unit, Welsh Government.
RAF, 1951. 5116 RAF 488 3447 11 May 1951. Aerial Photographs Unit, Welsh Government.
RAF, 1957. 5709 RAF58 2280 0079 26 September 1957. Aerial Photographs Unit, Welsh Government.

Websites
https://www.archwilio.org.uk
https://www.coflein.gov.uk/
https://places.library.wales/browse/
https://rcahmw.gov.uk/discover/list-of-historic-place-names/

9. Gazetteers

Table 3. All identified sites within the 500m study area (Designated sites in bold).

ID	Name	Date	Source	Impact	Easting	Northing
1	Clay Hills; house	Post medieval	CPAT 99029	No Change	331248	367678
2	Clay Hills Well II	Post medieval	CPAT 39754	No Change	331313	367689
3	The Hom Open Field system	Post medieval	CPAT 23604	No Change	331400	367750
4	Queensferry Stone I	Post medieval	CPAT 39755	No Change	331433	368329
5	Unwins Cottage; house	Post medieval	CPAT 23602, includes Coflein 152444	No Change	331490	367920
6	Clay Hills Well I	Post medieval	CPAT 39753	No Change	331509	367878
7	Queensferry Stone II	Post medieval	CPAT 39756	No Change	331557	368246
8	**Queensferry War Memorial Institute**	Modern	CPAT 59396, includes LBII Cadw 84434	Negligible; setting	331607	368132
9	Prisoner of War Camp	Modern	CPAT 85788	No Change	331626	368323
10	Queensferry Stone III	Post medieval	CPAT 39757	No Change	331629	368202
11	Aston Hall Colliery Railway	Post medieval	CPAT 37790, includes CPAT 99063	Negligible; physical	331650	367799
12	Hawarden Old Clay Pits	Post medieval	CPAT 99053	No Change	331685	367833
13	Aston Hall Colliery	Post medieval	CPAT 103785	No Change	331700	367800
14	Church	Post medieval	Coflein 421449	No Change	331737	368123
15	Trinity English Wesleyan Methodist Chapel	Post medieval	Coflein 8150	No Change	331740	368130
16	Queensferry Primitive Methodist Chapel	Post medieval	Coflein 8146	No Change	331760	368240
17	Queensferry Colliery	Post medieval	CPAT 37788	No Change	331801	367699
18	Queensferry Hall Garden	Post medieval	Coflein 266275	No Change	331820	368689
19	Coal Pit Field coal mine	Post medieval	CPAT 99045	No Change	331841	367857
20	Queensferry Railway Station	Post medieval	Coflein 34911	No Change	331860	368340
21	Queensferry railway station	Post medieval	Coflein 87049	No Change	331860	368360
22	Bethel Welsh Calvinistic Methodist Chapel	Modern	Coflein 8143	No Change	331864	368235

ID	Name	Date	Source	Impact	Easting	Northing
23	Queensferry railway	Post medieval	Coflein 41403	No Change	331870	368370
24	Queensferry Smithy	Post medieval	CPAT 103917	No Change	331900	368400
25	Airspeed Oxford II N4731; air crash site	Modern	Coflein 515673	No Change	331912	368542
26	Pillbox	Modern	CPAT 34256, includes Coflein 270407	No Change	331968	368769
27	Queensferry Landing Stage	Post medieval	CPAT 83055	No Change	331975	368785
28	Queensferry Quay	Post medieval	CPAT 34241	No Change	332000	368750
29	Queensferry Shipyard I	Post medieval	CPAT 39811	No Change	332000	368700
30	Aston Colliery Tramway	Post medieval	CPAT 87848	No Change	332111	368635
31	**Bascule Bridge**	Modern	CPAT 59397, includes CPAT 87852, Coflein 401387, LBII Cadw 84433, Cadw 85251	Slight; setting	332180	368640
32	Queensferry Jetty slipway	Post medieval	CPAT 87850	No Change	332190	368667
33	Victoria Jubilee Bridge	Post medieval	CPAT 120866, includes CPAT 34267 & 34268 buttresses	No Change	332210	368689
34	Mission Hall	Post medieval	Coflein 8138	No Change	332230	367760
35	Holy Innocents Church	Post medieval	Coflein 420482	No Change	332232	367758
36	St Andrew's Church	Post medieval	Coflein 12450	No Change	332250	368760
37	Aston Quay Weighbridge	Post medieval	CPAT 83027	Negligible; physical	332265	368490
38	Ferry Inn	Post medieval	CPAT 83026	No Change	332270	368730
39	Chapel	Post medieval	Coflein 8149	No Change	332280	367660
40	Aston Quay Landing Stage I	Post medieval	CPAT 83028	No Change	332285	368585
41	Lower Kings Ferry crossing	Post medieval	CPAT 34243	No Change	332300	368700
42	Queensferry Landing Stage II	Post medieval	CPAT 87851	No Change	332305	368570
43	Aston Quay Building	Post medieval	CPAT 83033	Negligible, setting	332310	368495
44	Queensferry Chemistry Factory	Post medieval	CPAT 87849	No Change	332321	367829
45	Queensferry Chapel	Post medieval	CPAT 83034	Negligible; physical	332330	368450
46	Queensferry Shipyard II	Post medieval	CPAT 83030	Negligible; physical	332330	368520
47	Queensferry Chemical Works Railway	Post medieval	CPAT 83035	Negligible; physical	332340	368430
48	Aston Quay; port	Post medieval	CPAT 83031	Major; physical	332340	368510
49	Aston Railway	Post medieval	CPAT 37789	Negligible; physical	332341	368570
50	Aston Quay Landing Stage IV	Post medieval	CPAT 83032	Major; physical	332355	368510
51	Aston Quay Landing Stage III	Post medieval	CPAT 83029	Major; physical	332359	368537
52	Queensferry Chemical Works	Post medieval	CPAT 103918	No Change	332400	368397
53	Aston Quay Landing Stage V	Post medieval	CPAT 87850	Major; physical	332415	368505
54	Garden City Congregational Chapel	Post medieval	Coflein 8139	No Change	332420	368860
55	Aston Quay Landing Stage VI	Post medieval	CPAT 34240	No Change	332440	368487
56	Queensferry Wireworks Factory	Post medieval	CPAT 37793	No Change	332441	367669
57	Aston Quay Landing Stage VII	Post medieval	CPAT 34255	No Change	332492	368457
58	Queensferry Munitions Factory	Modern	CPAT 34291	No Change	332500	368000

ID	Name	Date	Source	Impact	Easting	Northing
59	Queensferry Prisoner of War Camp	Modern	CPAT 70230	No Change	332500	368000
60	Garden City School	Modern	Coflein 418718	No Change	332504	368921
61	**Former Willans & Robinson Factory West Block**	Modern	CPAT 59395, includes LBII Cadw 85240	Slight; setting	332510	368065
62	Queensferry Willans & Robinson Factory Railway	Modern	CPAT 83039	No Change	332540	367950
63	Mancot Colliery Tramway	Post medieval	CPAT 37792	No Change	332551	368418
64	Mancot Tramway Pier	Post medieval	CPAT 83036	No Change	332580	368400
65	**Former Willans & Robinson Factory Central Block**	Modern	CPAT 59393, includes LBII Cadw 85241	Slight; setting	332582	368020
66	**Former Willans & Robinson Factory East Block**	Modern	CPAT 59394, includes LBII Cadw 85242	Slight; setting	332642	367983
67	Queensferry Willans & Robinson Factory Reservoir	Modern	CPAT 83037	No Change	332710	368180
68	Queensferry Willans & Robinson Factory Aerial Ropeway	Modern	CPAT 83083	No Change	332720	368130
69	**Ferry Bank Farm**	Post medieval	CPAT 59399, includes LBII Cadw 85249	Slight; setting	332840	368750
70	Queensferry Willans & Robinson Factory Landing Stage I	Modern	CPAT 34254	No Change	332861	368233
71	Dee Boundary Stone	Post medieval	CPAT 103919	No Change	332957	368176
72	Sealand Manor Farm Watering Place	Modern	CPAT 87829	No Change	333125	368603
73	Pillbox, Blue Bridge	Modern	CPAT 121200	No Change	332220	368610
74	Storage tank	Modern	CPAT 121199	No Change	332322	368712
75	Sluice	Modern	CPAT 23604	Major; physical	332317	368492
76	United Reformed Church	Modern	CPAT 132735	No Change	332431	368876
77	Sealand Garden City	Modern	CPAT 130865	No Change	332622	369186
78	Pillbox, Sandycroft	Modern	CPAT 34252	No Change	333180	368000
79	Pillbox	Modern	DBA	No Change	332528	368424
80	Hawarden Castle Hotel	Post Medieval	CPAT 150270	No Change	332087	368576
81	Hawarden Castle Outbuilding I	Post Medieval	CPAT 150271	No Change	332069	368582
82	Hawarden Castle Outbuilding II	Post Medieval	CPAT 150272	No Change	332068	368568

Table 4. Description of historical assets directly affected by construction activity.

ID:	8
NGR:	331607 368132
Source:	CPAT PRN 59396. Cadw 84434, LBII
Description:	Queensferry War Memorial Institution
Impact:	Negligible. Very limited changes will be observed from this location, all will be related to the existing road activities.
Recommended Action:	Monitoring
ID:	11
NGR:	331650 367799
Source:	CPAT PRN 37790 also including CPAT PRN 99063
Description:	Aston Hall Colliery Railway, shown on historic mapping. See Figure 7.
Impact:	Negligible. The route of the railway lies under the existing A494 road.
Recommended	Monitoring

Action:	
ID:	31
NGR:	332180 368640
Source:	CPAT PRN 59397 also including CPAT PRN 87852, Coflein 401387. Cadw 84433 LBII and Cadw 85251 LBII
Description:	Bascule Bridge, 'Blue Bridge'. See Figures 14, 15, 16.
Impact:	Slight. The existing A494 road bridge nearby will be replaced by a bridge of similar design. During construction there will be temporary effects.
Recommended Action:	Monitoring
ID:	37
NGR:	332265 368490
Source:	CPAT PRN 83027
Description:	Aston Quay Weighbridge, shown on historic mapping
Impact:	Negligible. The area now lies under the line of the existing A494 road.
Recommended Action:	Monitoring
ID:	43
NGR:	332310 3684950
Source:	CPAT PRN 83033
Description:	Aston Quay Building, shown on historic mapping
Impact:	Negligible. The area now lies under the line of the existing A494 road.
Recommended Action:	Monitoring
ID:	45
NGR:	332330 368450
Source:	CPAT PRN 83034
Description:	Queensferry Chapel, shown on historic mapping, structure demolished in 1949.
Impact:	Negligible. The area lies under industrial development.
Recommended Action:	Monitoring
ID:	46
NGR:	332330 368520
Source:	CPAT PRN 83030
Description:	Queensferry Shipyard II shown on historical mapping. See Figure 7.
Impact:	Negligible. The area lies under the embankment of the existing A494.
Recommended Action:	Monitoring
ID:	47
NGR:	332340 36843
Source:	CPAT PRN 83031
Description:	Queensferry Chemical works Railway shown on historical mapping
Impact:	Negligible. The railway has been removed, and the area lies under industrial development.
Recommended Action:	Monitoring
ID:	48
NGR:	332340 368510
Source:	CPAT PRN 8303
Description:	Aston Quay. This is a small port based around the mouth of the Aston inlet. The port developed as a means of exporting coal from the various small mines to the south. See Figure 7.
Impact:	Major. Although many of the structures relating to the port have been removed or obliterated by

	construction of the existing A494 embankment, various components such as the landing stages and wharf around the Aston inlet appear to survive as substantial structures. The work in constructing a second bridge to the A494 will cover much of the area and remove any elements that still survive.
Recommended Action:	Detailed survey of existing structures, together with mitigation excavation and recording of features of the port that may survive and be exposed by construction work.
ID:	49
NGR:	332341 368570
Source:	CPAT PRN 37789
Description:	Aston railway shown on historical mapping
Impact:	Negligible. Much of the route of the railway lies under the embankment of the A494.
Recommended Action:	Monitoring.
ID:	50
NGR:	332355 368510
Source:	CPAT PRN 83032
Description:	Aston Quay Landing Stage IV shown on historical mapping. The feature is not visible in the 1962 aerial photograph (Figure 18), so appears to have been removed by then.
Impact:	Major. Although no evidence for the landing stage is visible, traces of it may survive. The reported position lies in an area that will see much work in construction of the new bridge.
Recommended Action:	Monitoring.
ID:	51
NGR:	332359 368537
Source:	CPAT PRN 83029
Description:	Aston Quay Landing Stage III shown on historic mapping. Remains of a timber structure are visible on the riverbank. Two rectangular concrete blocks forming part of the structure are present, partly covered in undergrowth. See Figures 17, 18, 20, 21, 22, 23, 24, 25, 26 and 27. The actual NGR is different to that contained in the CPAT HER record.
Impact:	Major. The remains of the landing stage lie in the line of the proposed bridge. All remaining features are likely to be removed. The 1962 aerial photograph (Figure 18) shows two additional concrete blocks further inland from the riverbank. One is possibly visible today beyond the fence (Figure 21). The furthest inland has either been removed or is hidden in undergrowth (no access was available to this area). These concrete blocks apparently carried the weight of the railway structure as it rose to a sufficient height to discharge into the waiting ships at the quay.
Recommended Action:	Detailed recording before construction activity.
ID:	53
NGR:	332415 368506
Source:	CPAT PRN 830540
Description:	Aston Quay Landing Stage V shown on historic mapping. A few timbers are reported protruding from the riverbank. Nothing was seen during site visits.
Impact:	Major. The position lies in an area that will see much work in construction of the new bridge.
Recommended Action:	Recording and monitoring during construction.
ID:	61
NGR:	332510 368065
Source:	CPAT PRN 59395, including Cadw 85240 LBII
Description:	Former Willans and Robinson Factory, West Block.
Impact:	Slight. The setting of the building will be only marginally changed. A line of trees currently screens the site from the road, while the building cannot be seen from the existing road. The building is also largely screened from the bridge by a large yellow industrial building.

	Temporary impacts may be visible during construction.
Recommended Action:	Monitoring.
ID:	65
NGR:	332582 368020
Source:	CPAT PRN 59393, including Cadw 85241 LBII
Description:	Former Willans and Robinson Factory, Central Block.
Impact:	Slight. The setting of the building will be only marginally changed. A line of trees currently screens the site from the road, while the building cannot be seen from the existing road. The building is also screened from the bridge by a large yellow industrial building. Temporary impacts may be visible during construction.
Recommended Action:	Monitoring.
ID:	66
NGR:	332642 3679820
Source:	CPAT PRN 59394, including Cadw 85242 LBII
Description:	Former Willans and Robinson Factory, East Block.
Impact:	Slight. The setting of the building will be only marginally changed. A line of trees currently screens the site from the road, while the building cannot be seen from the existing road. The building is also screened from the bridge by a large yellow industrial building. Temporary impacts may be visible during construction.
Recommended Action:	Monitoring.
ID:	69
NGR:	332840 368750
Source:	CPAT PRN 59399, including Cadw 85249 LBII
Description:	Ferry Bank Farm
Impact:	Slight. The setting of the building will be only marginally changed. Although the house is close to the existing road, the view of the bridge will be very similar to the current one. Temporary impacts may be visible during construction.
Recommended Action:	Monitoring.
ID	75
NGR	332317 368492
Source	CPAT PRN
Description	Sluice controlling water flow in the ‘Queensferry Drain’. The feature was probably constructed as part of the A494 road construction in 1960-2. This will be removed and a new alignment for the Queensferry Drain created as part of the proposed works.
Impact	Major. The structure will be removed entirely during construction.
Recommended Action	Photographic recording of feature during site clearance.

Table 5. Designated sites.

Name	Reference	Easting	Northing
Queensferry War Memorial Institution	LB 84434	331602	368150
Ewloe Castle	FL002	328830	367517
Hawarden Castle	FL016	331931	365372
Trueman's Hill motte	FL030	331278	365976
The 'Lock-Up', Hawarden	FL078	331766	365723
Green Lane Farm Moated Site	FL176	333335	363841
Kelsterton Brewery	FL180	327755	370587
Kelsterton Hall	LB 1	327841	370714
Parish Church of St Deiniol	LB 12	331546	365922
Ewloe Castle	LB 13	328840	367507
Hawarden Castle (Old)	LB 14	331936	365345
Broadlane	LB 15	332230	365466
Gateway adjoining Hawarden New Castle to the E, with Flanking Crenelated Walls	LB 15014	332210	365465
Tea Pavilion, Hawarden Castle Estate	LB 15015	332149	365428
75m Section of Kitchen Wall to NW of New Castle	LB 15016	332121	365554
Garage Yard and Gallery (former stables and coach-house)	LB 15017	332137	365602
Garage Yard and Gallery (former stables and coach-house)	LB 15018	332122	365605
Glynne Cottage	LB 15019	331830	365550
Saint Deiniol's Parish Church's Entrance Gates and Churchyard Walls	LB 15020	331516	365888
Church Hall of Church of St Deiniol	LB 15021	331522	365850
White House (formerly School Mistresses House)	LB 15022	331542	365847
Tithe Barn	LB 15023	331523	365871
Tithe Barn Cottage	LB 15024	331545	365866
St Deiniol's Library	LB 15025	331458	365919
The Gladstone Monument	LB 15026	331457	365847
Masonic Hall	LB 15027	331408	366031
Entrance Gate to Hawarden Castle	LB 15028	331596	365743
Curtain Walls and Precinct Walls to Hawarden Castle	LB 15029	331576	365747
Gate Lodge	LB 15030	331606	365740
NO 4, Glynne Way (S side)	LB 15031	331617	365747
NO 6, Glynne Way (S side)	LB 15032	331621	365745
NO 8, Glynne Way (S side)	LB 15033	331626	365743
NO 10, Glynne Way (S side)	LB 15034	331630	365741
NO 12, Glynne Way (S side)	LB 15035	331634	365739
NO 14, Glynne Way (S side)	LB 15036	331638	365737
NO 16, Glynne Way (S side)	LB 15037	331642	365735
NO 18, Glynne Way (S side)	LB 15038	331645	365733
NO 20, Glynne Way (S side)	LB 15039	331650	365732
NO 22, Glynne Way (S side)	LB 15040	331654	365730
NO 24, Glynne Way (S side)	LB 15041	331658	365729
NO 26, Glynne Way (S side)	LB 15042	331662	365728
NO 28, Glynne Way (S side)	LB 15043	331666	365726
NO 30, Glynne Way (S side)	LB 15044	331670	365724
NO, 32 Glynne Way (S side)	LB 15045	331674	365722
NO 42, Glynne Way (S side)	LB 15046	331715	365705
NO 44, Glynne Way (S side)	LB 15047	331720	365703
NO 46, Glynne Way (S side)	LB 15048	331723	365702
NO 48, Glynne Way (S side)	LB 15049	331728	365700
NO 52, Glynne Way (S side)	LB 15051	331736	365696
NO 54, Glynne Way (S side)	LB 15052	331740	365695
NO 56, Glynne Way (S side)	LB 15053	331744	365693
NO 58, Glynne Way (S side)	LB 15054	331753	365687
NO 60, Glynne Way (S side)	LB 15055	331767	365676
NO 62, Glynne Way (S side)	LB 15056	331807	365643
Retaining Wall to Street	LB 15057	331820	365650
Wynt Lodge	LB 15058	331909	365584
N Entrance to Gatepiers and Scree Walls to Hawarden Castle	LB 15059	332165	365649

Name	Reference	Easting	Northing
The Glynne Arms PH	LB 15060	331592	365782
1. Rear Courtyard Ranges at Glynne Arms	LB 15061	331602	365798
2. Rear Courtyard Ranges at Glynne Arms	LB 15062	331613	365794
Former Shambles	LB 15063	331605	365774
Former Police Station	LB 15064	331658	365752
Former Town Hall	LB 15065	331673	365744
Base of Former Village Pump	LB 15066	331746	365713
Elms Cottage	LB 15067	331769	365700
Attached Boundary Wall to the East	LB 15068	331777	365685
The Hawarden Gymnasium	LB 15069	331819	365665
The Hawarden Institute	LB 15070	331830	365659
The Rear of Hawarden Institute	LB 15071	331838	365667
NO 33, Glynne Way (N Side)	LB 15072	331839	365643
NO 35, Glynne Way (N Side)	LB 15073	331843	365641
NO 37, Glynne Way (N Side)	LB 15074	331849	365639
NO 39, Glynne Way (N Side)	LB 15075	331857	365635
NO 41, Glynne Way (N Side)	LB 15076	331864	365630
NO 43, Glynne Way (N Side)	LB 15077	331870	365627
Domestic and Agricultural Range to the NE of Kearsley Farm	LB 15078	330644	365926
Gladstone Memorial Fountain	LB 15079	331574	365769
Lloyds Bank	LB 15080	331553	365775
Attached Former Bank Manager Manager's House to Lloyds Bank	LB 15081	331543	365766
The Fox and Grapes PH	LB 15082	331516	365785
Range to rear of The Fox and Grapes PH	LB 15083	331511	365768
Former Estate Granary	LB 15084	331508	365751
NO 24, The Highway (S side)	LB 15085	331447	365796
Stafford House	LB 15086	330925	365974
Detached Coach House to SW of Stafford House	LB 15087	330869	365962
Former Head Master's House at Hawarden High School	LB 15089	330482	366236
The Post Office	LB 15090	331562	365793
Surgery House	LB 15091	331510	365803
NO 17, The Highway (N side)	LB 15092	331500	365806
The Village Pump	LB 15093	331483	365813
The War Memorial	LB 15094	331450	365817
NO 3, Rectory Lane (E side)	LB 15095	331580	365823
NO 4, Rectory Lane (E side)	LB 15096	331579	365832
NO 5, Rectory Lane (E side)	LB 15097	331579	365838
NO 1, Rectory Lane (E side)	LB 15098	331563	365847
NO 2, Rectory Lane (E side)	LB 15099	331563	365853
NO 7, Rectory Lane (E side)	LB 15100	331562	365859
NO 8, Rectory Lane (E side)	LB 15101	331563	365866
Hawarden Hayes	LB 15102	331156	365488
Aedocular Gateway at Aston Hall	LB 15103	330896	367024
White Cottage	LB 15104	330204	364278
Main House at Castle Hill Farm	LB 15105	329170	367342
Low attached extensions at Castle Hill Farm	LB 15106	329128	367318
Granary at Castle Hill Farm	LB 15107	329168	367390
Former Brewery at Castle Hill Farm	LB 15108	329099	367396
Adjacent Malting Tower at Castle Hill Farm	LB 15109	329062	367373
Former Stable Block at Castle Hill Farm	LB 15110	329066	367330
Brick-House Farmhouse	LB 15111	331163	366440
Attached Stable Range to Brick-House	LB 15112	331225	366449
Plas Moor	LB 15113	332954	366398
L-Plan range of Farm Buildings	LB 15114	332965	366497
Registry Office (Ice House to East)	LB 15381	331686	365870
Foot Bridge to old Castle, Hawarden Castle Estate	LB 16	332000	365368
County Record Office (former Rectory)	LB 19	331590	365899
Kentigern	LB 20	331561	365800
Church of the Holy Spirit	LB 20115	330041	367116
The Correction House	LB 21	331754	365726

Name	Reference	Easting	Northing
English Methodist Church	LB 21365	331205	365926
Gatepiers at former St John's Lodge, Hawarden Estate	LB 21366	331465	364932
The Elms	LB 22	331774	365694
Aston Hall	LB 23	330964	367010
Manor House	LB 24462	333871	365392
West Pair of Aircraft Hangars	LB 24539	333152	370190
South Pair of Aircraft Hangars	LB 24540	333359	370170
North Pair of Aircraft Hangars	LB 24541	333420	370269
Squire's Thatched (Formerly listed as Thatched Cottages)	LB 26	330934	364326
St Deiniols Ash	LB 3	331712	366264
Hawarden Castle (New)	LB 4	332182	365448
Church of St Ethelwold	LB 60	330936	368609
Telephone Call-box on the corner with Rectory Lane	LB 61	331566	365787
Church of St Bartholomew	LB 62	335255	368870
Church of St Mary	LB 80779	334245	364057
Churchyard boundary wall, Church of St Ethelwold	LB 84396	331003	368564
Forecourt walls, gates and railings, Shotton Infants School	LB 84397	330495	368817
Former Police Station, including forecourt wall, gates & railings	LB 84398	330614	369028
Shotton Infants School	LB 84400	330538	368843
The Clwyd PH	LB 84401	330619	368915
The Vicarage	LB 84402	331043	368516
Bascule Bridge	LB 84433	332205	368657
Queensferry War Memorial Institute	LB 84434	331602	368150
Former Willans & Robinson Factory, West Block	LB 85240	332486	368081
Former Willans & Robinson Factory, Central Block	LB 85241	332577	368038
Former Willans & Robinson Factory, East Block	LB 85242	332643	367993
Office Building, Corus Steelworks	LB 85247	331220	369375
Old Marsh Farm	LB 85248	333407	369751
Ferry bank Farm	LB 85249	332848	368756
(Title also listed in Queensferry rec no Bascule Bridge84434)	LB 85251	332243	368716
Churchyard Boundary Wall, Church of St Bartholomew	LB 85252	335271	368796
Church of St Mark	LB 85254	329070	369910
Dock Basin	LB 85255	329401	369925
Former Barn, Old Quay House Inn	LB 85257	329312	369884
Former Stable Block & attached boundary walls	LB 85258	328976	369875
Lychgate at Church of St Mark	LB 85260	329040	369951
Old Quay House Inn	LB 85262	329320	369917
The Ship Public House	LB 85264	329544	369626
The Vicarage	LB 85265	329024	369837
War Memorial	LB 85266	330310	369089
Manor Farm	LB 85412	333823	365440
Former Women's Land Army Hostel	LB 87601	336124	367993
Former Office Buildings, Shotton Steelworks	LB 87629	331301	369433
Hawarden Bridge	LB 85250	331044	369322
Hawarden Bridge	LB 84399	331097	369428
Hawarden High School	LB 15088	330553	366173

Table 6. Historic placenames recorded in study area (Source: RCAHMW).

Recorded Name	Grid Reference	Source
Landing Stage	SJ 32012 68778	OS 2nd edn 1898-1908
Queensferry Hotel	SJ 32363 68792	OS 2nd edn 1898-1908
Lower Ferry House and garden	SJ 32243 68753	Hawarden Tithe Map 1841
Victoria Jubilee Bridge	SJ 32217 68671	OS 2nd edn 1898-1908
Landing Stages	SJ 32324 68575	OS 2nd edn 1898-1908
Shipbuilding & Engineering Works	SJ 32372 68527	OS 2nd edn 1898-1908

River Dee	SJ 32660 68406	OS 2nd edn 1898-1908
Ferrybank Farm	SJ 32701 68774	OS 2nd edn 1898-1908
Stack yard	SJ 32857 68737	Hawarden Tithe Map 1841
River Field	SJ 32808 68210	Hawarden Tithe Map 1841
River Field	SJ 32756 68118	Hawarden Tithe Map 1841
Eight Acres	SJ 32674 67990	Hawarden Tithe Map 1841
Long Eight Acres	SJ 32498 67940	Hawarden Tithe Map 1841
Five Acres	SJ 32566 68070	Hawarden Tithe Map 1841
River Field	SJ 32629 68240	Hawarden Tithe Map 1841
River Field	SJ 32555 68293	Hawarden Tithe Map 1841
New Inclosure	SJ 32454 68436	Hawarden Tithe Map 1841
Honey Nook	SJ 32278 68219	Hawarden Tithe Map 1841
L. & N. W. R. CHESTER & HOLYHEAD	SJ 32181 68157	OS 2nd edn 1898-1908
Queensferry Chemical Works	SJ 32163 68345	OS 2nd edn 1898-1908
Honey Nook	SJ 32360 68363	Hawarden Tithe Map 1841
Ferry Field	SJ 32067 68408	Hawarden Tithe Map 1841
Home Field	SJ 32172 68506	Hawarden Tithe Map 1841
Inclosed	SJ 32277 68545	Hawarden Tithe Map 1841
Inclosed Garden	SJ 32207 68580	Hawarden Tithe Map 1841
New Inclosure	SJ 32082 68639	Hawarden Tithe Map 1841
New Inclosure	SJ 32010 68679	Hawarden Tithe Map 1841
Hawarden Castle Inn Buildings Yard etc	SJ 32038 68588	Hawarden Tithe Map 1841
Garden field	SJ 31859 68623	Hawarden Tithe Map 1841
Middle Field	SJ 31749 68540	Hawarden Tithe Map 1841
Hawarden Castle Hotel	SJ 31892 68548	OS 2nd edn 1898-1908
Saltney Field	SJ 32037 68115	Hawarden Tithe Map 1841
Barn field	SJ 32251 68050	Hawarden Tithe Map 1841
Barn field	SJ 32111 67934	Hawarden Tithe Map 1841

Figure 1 Project Limit Outline. Not to Scale.

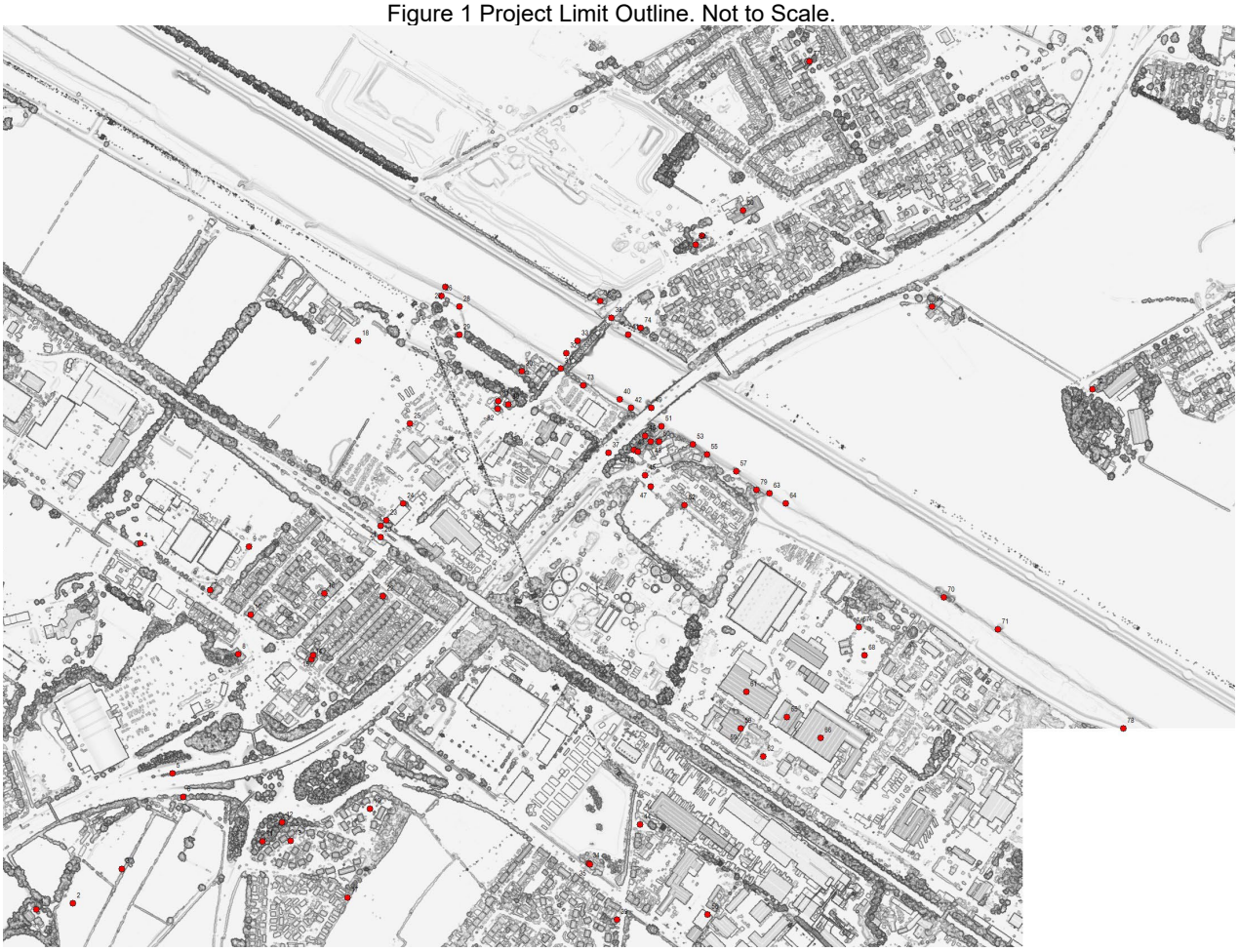

Figure 2 Desk Based Assessment sites 1-82. Not to Scale.

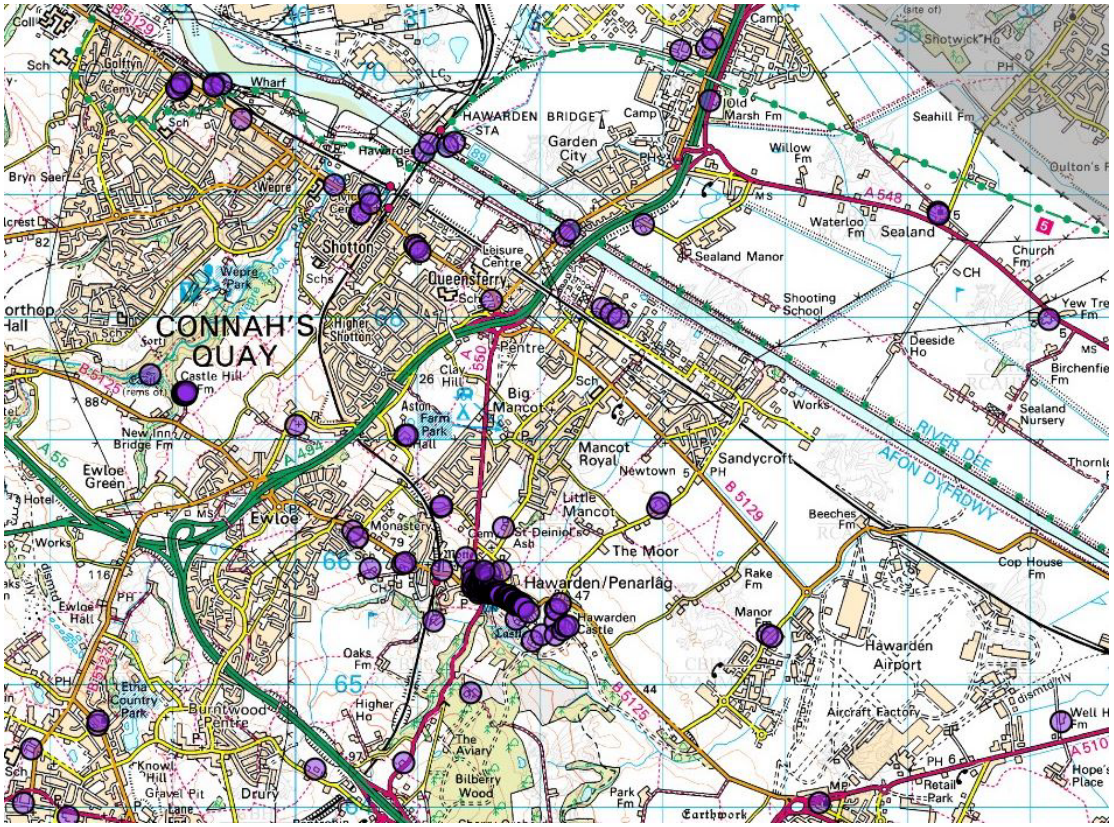

Figure 3 Designated Sites within 5km buffer zone around the Project.

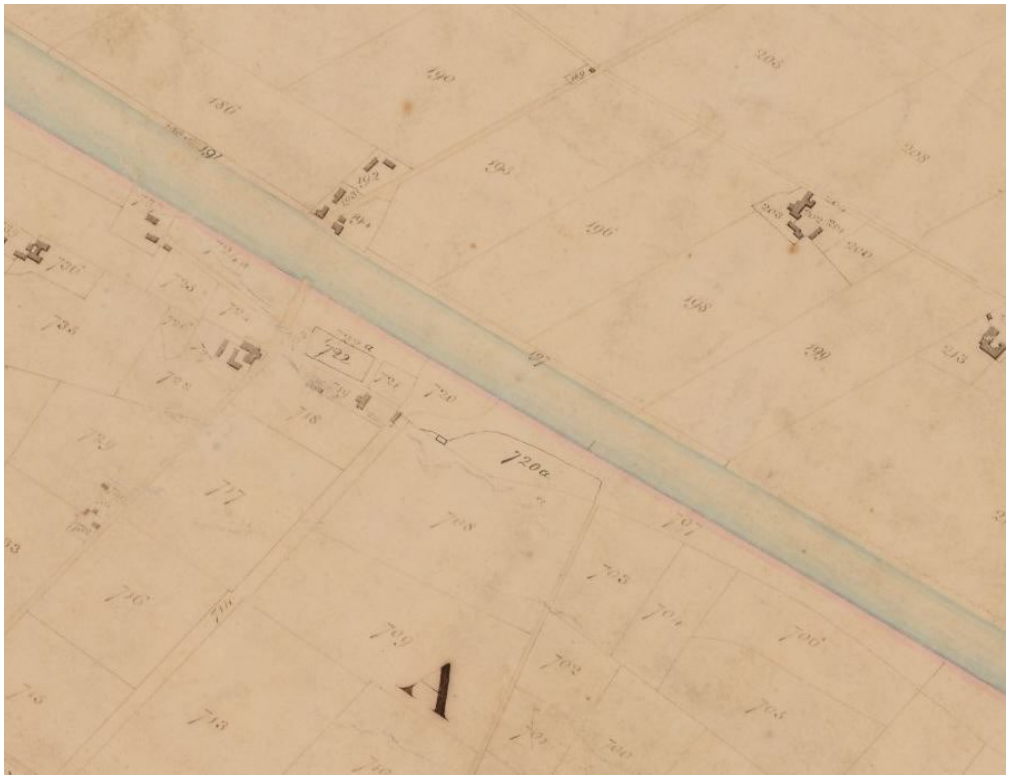
Figure 4 Hawarden Tithe Map, 1841.

Figure 5 Ordnance Survey 1871.

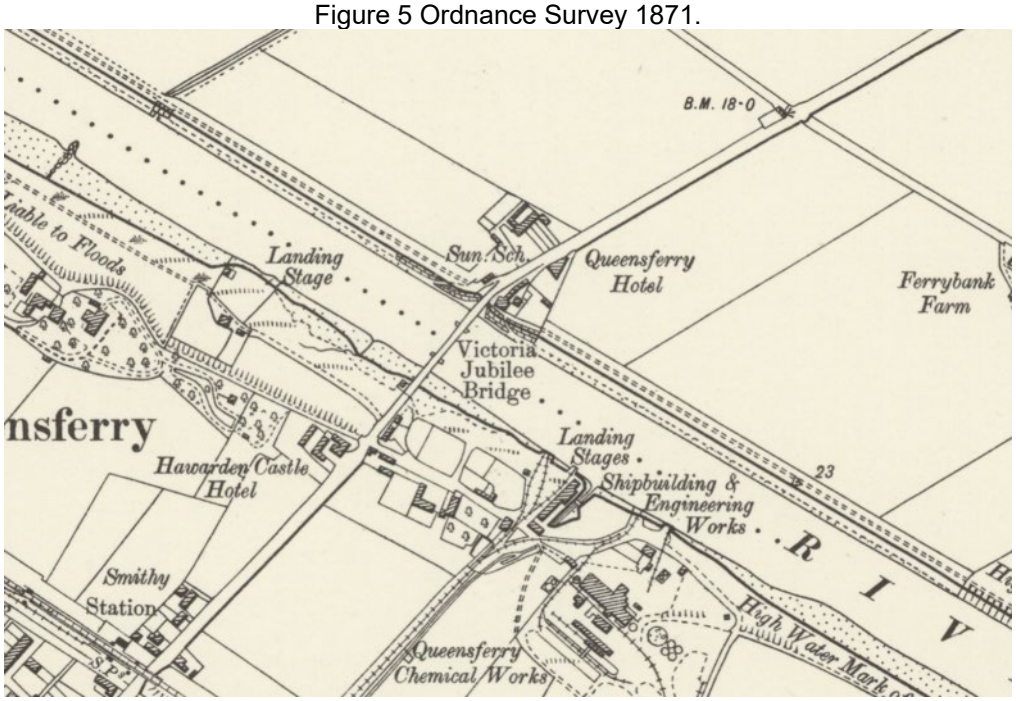

Figure 6 Ordnance Survey 1900.

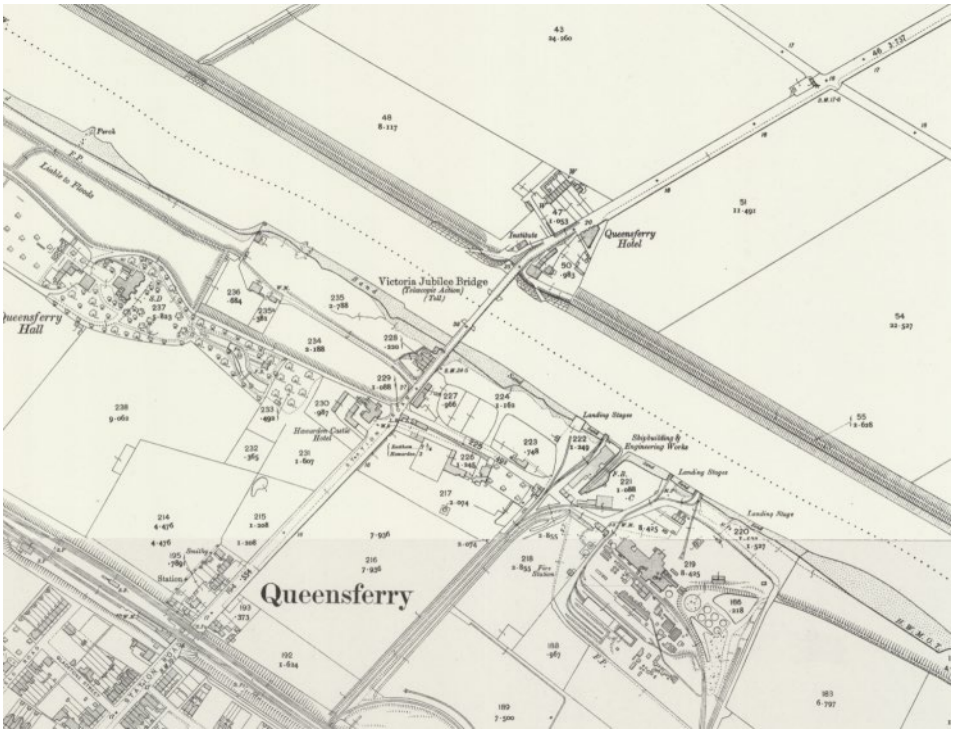

Figure 7 Ordnance Survey 1911.


Figure 8 RAF 1947.

Figure 9 RAF 1948.

Figure 10 RAF 1951.

Figure 11 RAF 1957.

Figure 12 OS 1959.

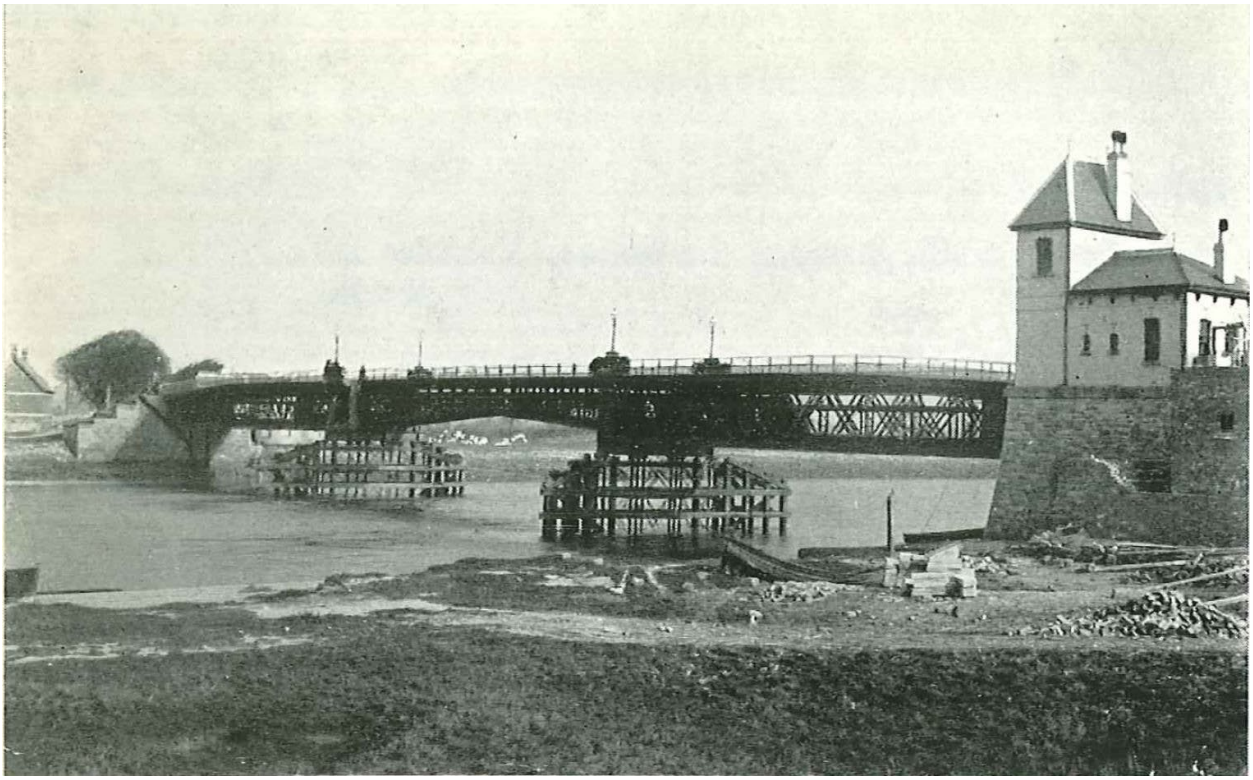

Figure 13 Site 33. The First Bridge-The Victoria Jubilee Bridge (Mott Hay and Anderson, 1962). View to northeast.

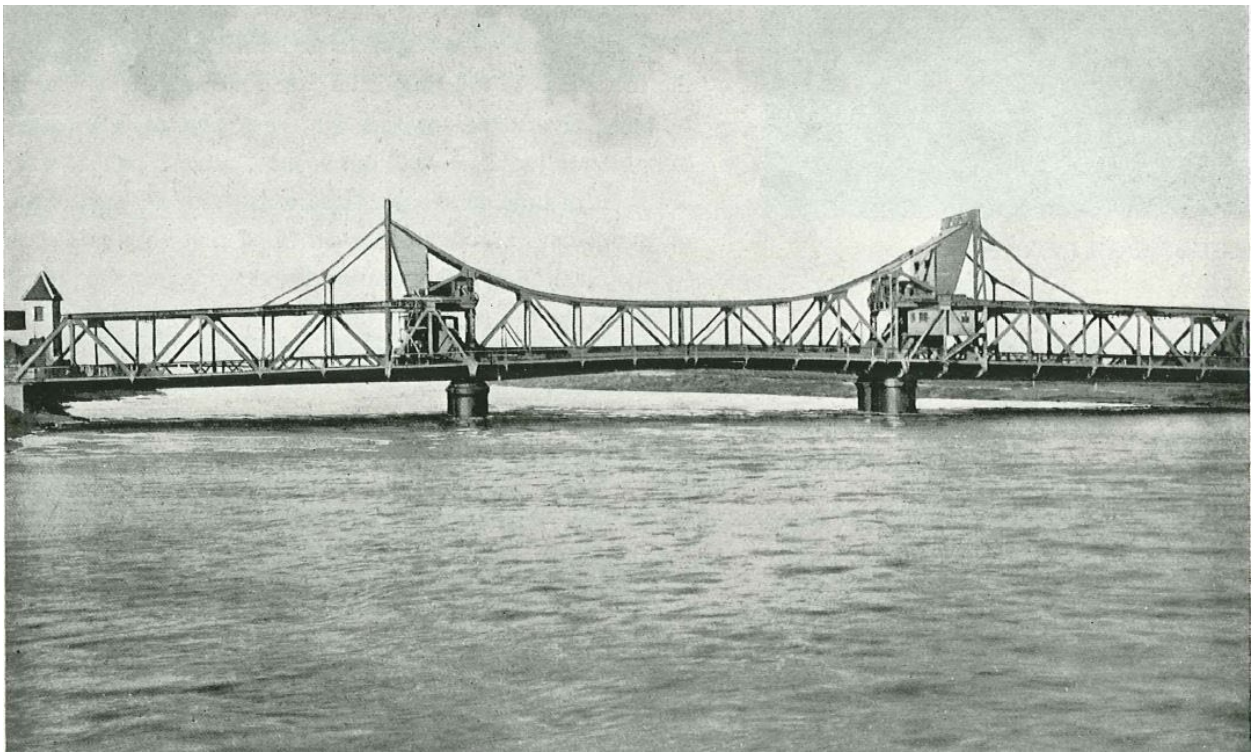

Figure 14 Site 31. The Second Bridge (Mott Hay and Anderson, 1962). View to west.

Figure 15 Site 31. Traffic Congestion on the Second Queensferry Bridge September 1950 (Mott Hay and Anderson, 1962). View to northeast.


Figure 16 Site 31. Bascule Bridge viewed from under existing Dee Bridge. View to northwest.

Figure 17 The new River Bridge (Mott Hay and Anderson, 1962). Note extensive evidence of landing stages site 51, east of the arch. View to east.

Figure 18 An Aerial Photograph of the New Bridge (Mott Hay and Anderson, 1962). Landing stage sites 51, 53, 55 and 57 are clearly visible. Note the extent of work around the Aston Inlet, Aston Shipyard (48) and Aston Quay building (43).

Figure 19. Drone image of the A494 Queensferry bridge, June 2024, from a similar viewpoint to the 1962 Figure 18. View to southeast.

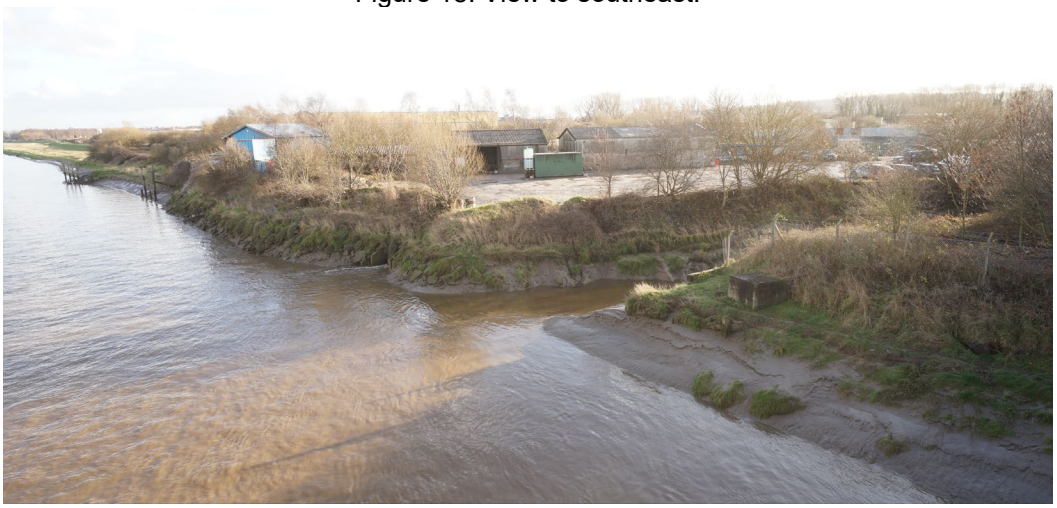

Figure 20 Landing Stage sites 51, 53, 55 and 57. Compare this view with that in 1962 (Figure 18). No evidence for 53 is visible. All have suffered some damage since 1962. View to southeast.

Figure 21 Detail of landing stage (51). Timbers can be seen at the water's edge with two concrete blocks above. A further concrete block is visible in the undergrowth beyond the fence. The fourth block visible in 1962 cannot be seen. View to south.

Figure 22 Sites 51, 55 and 57. Surviving structures. View to east.

Figure 23 Concrete post bases of Site 51, Aston Quay Landing Stage III, exposed at low tide, concrete block and timber upright behind. View to the south.

Figure 24 Site 51 concrete block and timber upright to the left. View to the east.

Figure 25 Site 51 concrete block with Site 33 Jubilee Bridge to rear. View to northwest.

Figure 26 Site 51. Detail of timbers and concrete block. View to east.

Figure 27 Site 51 concrete post bases. View to the north.

Figure 28 Sites 55 and 57. View to northeast.

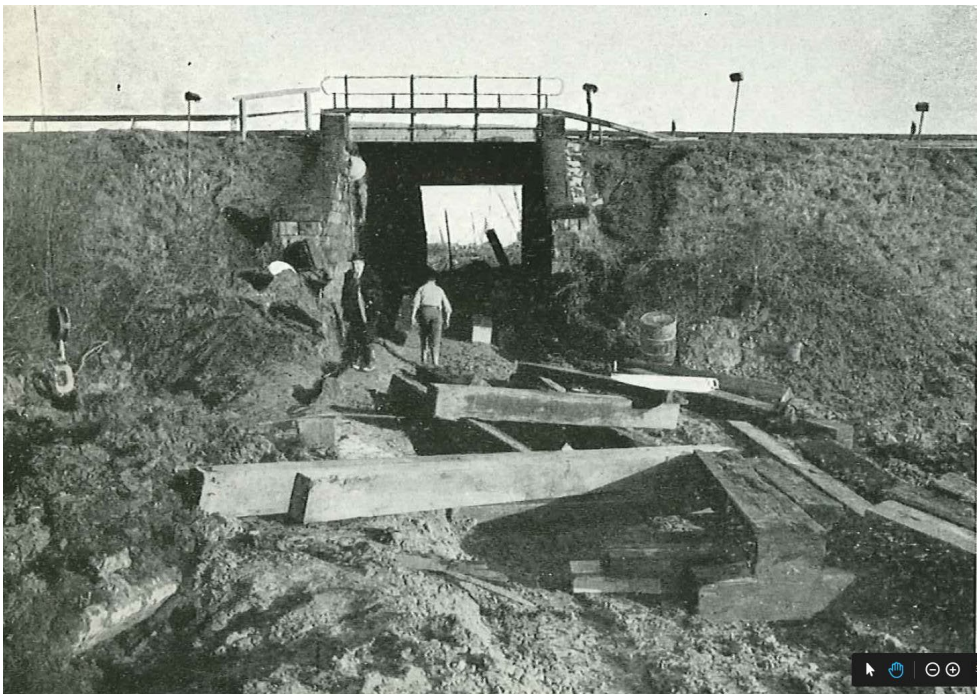

Figure 29 Sites 23 and 11 or 49. The Old Railway Bridge (Mott Hay and Anderson, 1962). The mainline (23) crossed over the mineral railways (11 and 49). This is a view at an early stage of work on construction of the A494.

Figure 30. Site 26, line of concrete blocks south of pillbox (lies to the left out of the image). View to southeast.

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 11.A: Air Quality Appendices

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Appendix A Modelled Particulate Matter Results

11.1.4 Modelled results at human health receptors for annual mean particulate matter (PM_{10}) ($\mu g/m^3$) in the Base year, Do-Minimum (DM) (without the Scheme) and Do-Something (DS) (with the Scheme) scenarios, used to inform the air quality assessment contained within Chapter 11 (Air Quality) of the Environmental Statement (ES), are presented in Table A-1 below.

Table A-1 Air quality assessment results at human receptors for PM_{10} ($\mu g/m^3$) in Base, DM and DS scenario

Receptor ID	Base year (2023)		Opening year (2029)			
	Background	Total	Background	DM Total	DS total	Change
HH1	10.9	15.3	10.3	14.7	14.7	<0.1
HH2	12.3	12.9	11.8	12.4	12.7	0.3
HH3	12.3	13.0	11.8	12.5	12.4	-0.1
HH4	12.3	14.3	11.8	13.8	12.9	-0.9
HH5	12.3	13.7	11.8	13.3	13.1	-0.2
HH6	12.3	13.0	11.8	12.5	12.5	<0.1
HH7	12.3	13.0	11.8	12.5	12.5	<0.1

Note: Human health receptors have been modelled at a height of 1.5m

Appendix B SATURN Traffic Data Report

11.1.5 Table B-1 presents the traffic data for the road network included in the dispersion modelling which is used to inform the air quality assessment contained within Chapter 11 (Air Quality) of the Environmental Statement (ES). The traffic data is presented as one-way (directional) flows.

11.1.6 The opening year traffic data is the same for both the Do-Minimum (DM) (without the Scheme) and Do-Something (DS) (with the Scheme) scenarios as the Scheme does not affect traffic flow or composition.

Table B-1 Traffic data for the operational phase modelled road network (one-way)

Figure ID	Link ID	Base (2023)							Opening year (2029)						
		AADT	HDV	Speed band category					AADT	HDV	Speed band category				
				AADT	AM	PM	IP	OP			AADT	AM	PM	IP	OP
1	84309_83515	2920	0	LC	LC	LC	LC	LC	3086	0	LC	LC	LC	LC	LC
2	83515_84309	2539	0	LC	LC	LC	LC	LC	2562	0	LC	LC	LC	LC	LC
3	83515_90232	3100	0	LC	LC	LC	LC	LC	3338	0	LC	LC	LC	LC	LC
4	90232_83515	2755	0	LC	LC	LC	LC	LC	2739	0	LC	LC	LC	LC	LC
5	90232_90298	3100	0	LC	LC	LC	LC	FF	3338	0	LC	LC	LC	LC	FF
6	90298_90232	2755	0	FF	FF	FF	FF	FF	2739	0	FF	FF	FF	FF	FF
7	90298_90297	3229	44	LC	LC	LC	LC	FF	3487	45	LC	LC	LC	LC	FF
8	90297_90298	2687	39	LC	LC	LC	LC	FF	2689	40	LC	LC	LC	LC	FF
9	83487_90297	2874	39	LC	LC	LC	LC	LC	2890	40	LC	LC	LC	LC	LC
10	90297_83487	3363	44	FF	FF	FF	FF	FF	3634	45	FF	FF	LC	FF	FF
11	83515_90227	1058	0	LC	LC	LC	LC	LC	955	0	LC	LC	LC	LC	LC
12	90227_83515	1023	0	LC	LC	HC	LC	LC	1030	0	LC	LC	HC	LC	LC
13	90227_90226	299	0	LC	LC	LC	LC	LC	292	0	LC	LC	LC	LC	LC
14	90226_90227	214	0	LC	LC	LC	LC	LC	319	0	LC	LC	LC	LC	LC
15	90337_83517	33759	2893	HS	HS	HS	HS	HS	35482	2978	HS	HS	HS	HS	HS
16	83516_83736	36280	2843	FF	FF	LC	HS	HS	38054	2948	FF	FF	LC	HS	HS
17	83736_90326	36280	2843	FF	FF	FF	FF	FF	38054	2948	FF	FF	FF	FF	FF
18	90356_90337	33759	2893	FF	FF	FF	FF	FF	35482	2978	FF	FF	FF	FF	FF

19	83737_90356	33759	2893	FF	FF	FF	FF	FF	35492	2979	FF	FF	FF	FF	FF
20	90326_83466	36269	2847	FF	FF	FF	FF	FF	38046	2952	FF	FF	FF	FF	FF
21	83456_83737	33759	2893	FF	LC	FF	FF	FF	35492	2979	FF	LC	FF	FF	FF
22	83468_83456	8769	900	FF	FF	FF	FF	FF	9172	941	FF	FF	FF	FF	FF
23	83464_83456	24990	1992	FF	FF	FF	FF	FF	26320	2038	FF	FF	FF	FF	FF
24	90326_83466	36269	2847	FF	FF	FF	FF	FF	38046	2952	FF	FF	FF	FF	FF
25	83466_83463	26271	1915	FF	FF	FF	FF	FF	27759	1978	FF	FF	FF	FF	FF
26	83466_83467	9998	932	HC	HC	HC	HC	HC	10287	974	HC	HC	HC	HC	HC

Note: Link ID is taken from the Scheme strategic traffic model, AADT = annual average daily traffic, HDV = heavy duty vehicle, HS= High Speed, FF= Free Flow, LC = Light Congestion, HC = Heavy Congestion.

Appendix C Air Quality Monitoring Report

Introduction

11.1.7 A six-month Scheme-specific monitoring survey of nitrogen dioxide (NO_2) concentrations has been undertaken for 9 sites along the Scheme corridor and surrounding area between June and December 2024.

11.1.8 The results have been used to supplement local authority monitoring data for Flintshire County Council to inform the baseline and to verify the detailed dispersion modelling assessment, which is detailed further in Appendix D (Air Quality Model Verification Report) of the Air Quality ES Appendices.

Methodology

11.1.9 NO_2 concentrations were monitored using Palmes diffusion tubes. These are plastic tubes that work through passive diffusion of compounds from the surrounding air. They are best suited for long term monitoring to provide sufficient time for enough NO_2 to be absorbed into the gauze within the tube for analysis.

11.1.10 The diffusion tubes were exposed by taking the cap off one end and securing it at a monitoring location for approximately one month at a time. The tubes include a triethanolamine (TEA) coated mesh which absorbs NO_2 and converts it to nitrite (NO_2-). They were prepared by Gradko International Ltd using 50% TEA in acetone, which is the same type of diffusion tube that Flintshire County Council (FCC) uses for their local authority monitoring. Gradko International Ltd analysed the diffusion tubes to provide a mean NO_2 concentration for the monitoring period. This process was repeated for each month of the monitoring period.

11.1.11 The raw data obtained from the six-month diffusion tube survey was annualised and bias adjusted to enable comparison with the annual mean NO_2 objective. The methodology behind the adjustment process is outlined in paragraph 11.1.14 to 11.1.20.

11.1.12 The location of each monitoring site is presented in Table C-1 below and Figure 11.6 (Air Quality Monitoring Locations) of the ES Figures. Photos of the diffusion tubes installed at the monitoring sites are displayed in Figure C-1 to C-9.

Table C-1 Diffusion tube site location

Site ID	Site location	British national grid coordinates		Site type
		X	Y	
D1	Aston Road	330793	367433	Roadside
D2	A494 / Dundas Street 1	331944	368152	Roadside
D3	A494 / Dundas Street 2	331968	368178	Roadside
D4	Dundas Street / Queen Street	331937	368206	Urban background
D5	Riverside Way	332278	368489	Roadside
D6	Gallagher Maintenance - Traveller site	332277	368452	Urban background
D7	Wales Coast Path	332403	368651	Roadside
D8	Fox's Lane	332837	368774	Roadside
D9	Fox's Lane / Manor Road	333173	368646	Urban background

Note: As defined in Defra's TG22, a roadside site is 'A site sampling typically within 1-5m of the kerb of a busy road'. An urban background site is an 'An urban location distanced from sources and therefore broadly representative of city-wide background conditions, e.g. urban residential areas'.

Monitoring dates

11.1.13 Monitoring was undertaken at 9 locations, between 5 June and 2 December 2024, with the diffusion tubes changed monthly between these dates. The start and end dates, and length of exposure, of each of the monitoring periods are presented in Table C-2 below. Time-weighted concentrations have been calculated for each of the monitoring periods, to account for variations in the length of exposure.

Table C-2 Diffusion tube exposure periods

Monitoring period	Start date	End date	Length of exposure (number of days)
1	5 June 2024	3 July 2024	28
2	3 July 2024	1 August 2024	29
3	1 August 2024	6 September 2024	36
4	6 September 2024	1 October 2024	25
5	1 October 2024	6 November 2024	36
6	6 November 2024	2 December 2024	26

Bias adjustment

11.1.14 Diffusion tubes are an indicative monitoring technique and may exhibit biases relative to more accurate continuous reference analysers, with positive bias being more common than negative (i.e. diffusion tubes are more likely to record concentrations higher than the true value rather than lower). In order to correct for this bias, a factor is derived and applied to the final diffusion tube results. Bias adjustment factors can be calculated by carrying out a specific co-location study as part of a monitoring survey or by using a combined national bias adjustment factor available from the Department for Environment, Food and Rural Affairs (Defra). National bias adjustment factors are collated in a national database[1] (Local Air Quality Management (LAQM) National Diffusion Tube Bias Adjustment Factor Spreadsheet) from a number of co-location studies, allowing the bias at a range of site locations with consistent analysis methods (laboratory and analysis technique) to be considered.

11.1.15 The national bias adjustment factor method has been used to adjust the monitoring results rather than the local factor. Site D1 is co-located with an automatic monitor operated locally by an external organisation. However data from this automatic monitoring site for 2023 is not available. On this

[1] Defra. (2024). National Bias Adjustment Factors. Retrieved from https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/

basis, the national bias adjustment factor method has therefore been adopted.

11.1.16 Bias adjustment of the monitoring results has been undertaken in line with the national bias adjustment factor for 2023 of 0.83, which is the latest factor currently available[1]. This national factor is based on the results of co-location studies that had also used diffusion tubes prepared by Gradko International Ltd using the 50% TEA in acetone method. The national bias adjustment spreadsheet is updated regularly as results from each local authority are collated.

Annual adjustment

11.1.17 Annualisation is a technique used to estimate an annual average from a part year (period) average and is applied where monitoring has been undertaken for less than 75% of the year (i.e. 9 months). The methodology, as outlined in Box 7-10 of Defra's TG22[2], consists of comparing the period mean for each individual diffusion tube to the annual mean for the desired annualisation year using continuous monitoring data from nearby Automatic Urban and Rural Network (AURN) sites.

11.1.18 Since the diffusion tube survey was undertaken for six months from June 2024 to December 2024, it was necessary to convert the period data to an annual mean concentration to allow comparison with the annual mean NO_2 objective (see Table 11-1 of Chapter 11 (Air Quality) of the ES for further detail on relevant air quality objectives).

11.1.19 Automatic monitoring data was obtained from the AURN stations in background locations within 50 miles (80.5 km) of the Project and with a minimum data capture of 85%, in line with Defra's TG22[2]. The following AURN sites were used to undertake the annualisation:

- Crewe Coppenhall

[2] Defra. (2022). Local Air Quality Management – Technical Guidance LAQM.TG22. Retrieved from https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

- Glazebury
- Wigan Centre
- Wirral Tranmere

11.1.20 Table C-3 presents the annual mean NO_2 concentration and range of period mean NO_2 concentrations for each AURN site, whilst Table C-4 presents the annualisation factor for each location.

Table C-3 AURN site information

Site ID	Distance from the Scheme (km)	Site type	2023 data capture (%)	2023 annual mean NO_2 concentration (µg/m³)
Crewe Coppenhall	38	Urban background	98.9	11.2
Glazebury	45	Rural background	95.8	12.1
Wigan Centre	45	Urban background	100	14.8
Wirral Tranmere	18	Urban background	92.8	12.8

Table C-4 Summary of annualisation factors

Site ID	Annualisation factor				Average annualisation factor
	Crewe Coppenhall	Glazebury	Wirral Tranmere	Wigan Centre	
D1 to D8[(a)]	1.1097	1.1383	1.0209	1.0957	1.0912
D9	1.0626	1.0831	0.9633	1.0461	1.0387

Note: [(a)] Calculated based on six months of Scheme-specific monitoring data collected

[(b)] Calculated based on five months of Scheme-specific monitoring data collected as the diffusion tube in month one was missing.

Monitoring results

11.1.21 The annualisation factor for each location was then applied to the bias adjusted diffusion tube results to convert them to an annual mean value for 2023. The raw NO_2 concentrations and bias adjusted and annualised NO_2 are presented in Table C-5.

Table C-5 Scheme-specific monitoring data

Site ID	Survey period data capture (%)	Measured NO_2 average concentration ($\mu g/m^3$)	2023 bias adjusted and annualised NO_2 concentration ($\mu g/m^3$)
D1	100	28.2	25.6
D2	100	28.6	25.9
D3	100	28.1	25.5
D4	100	17.2	15.5
D5	100	31.4	28.4
D6	100	17.7	16.0
D7	100	15.9	14.4
D8	100	12.8	11.6
D9	83.3	11.5	9.9

11.1.22 Table C-5 shows that no exceedances of the NO_2 annual mean air quality objective of 40$\mu g/m^3$ were recorded. The greatest annual mean NO_2 concentration of 28.4$\mu g/m^3$ was monitored at site D5, located adjacent to the A494.

11.1.23 In addition, Defra's TG22[2] indicates that the hourly NO_2 air quality objective of 200$\mu g/m^3$ (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60$\mu g/m^3$. As all predicted annual mean concentrations of NO_2 are well below 60$\mu g/m^3$, no exceedances of the 1-hour NO_2 objective are expected.

11.1.24 Defra's TG22[2] also recommends that monitoring data is distance corrected for relevant exposure where the annual mean NO_2 concentration is within 10% of the NO_2 annual objective of 40µg/m^3 (i.e. above 36µg/m^3), in order to account for the inherent uncertainty in diffusion tube monitoring concentration data. As the greatest annual mean NO_2 concentration is 28.4µg/m^3, distance correction is not required.

Site Photos

Figure C-1 Photo of diffusion tubes installed at Site D1

Figure C-2 Photo of diffusion tubes installed at Site D2

Figure C-3 Photo of diffusion tubes installed at Site D3

Figure C-4 Photo of diffusion tubes installed at Site D4

Figure C-5 Photo of diffusion tubes installed at Site D5

Figure C-6 Photo of diffusion tubes installed at Site D6

Figure C-7 Photo of diffusion tubes installed at Site D7

Figure C-8 Photo of diffusion tubes installed at Site D8

Figure C-9 Photo of diffusion tubes installed at Site D9

Appendix D Air Quality Model Verification Report

Overview

11.1.25 Model verification is a process by which checks are carried out to determine the performance of a dispersion model at a local level, primarily by comparison of modelled results with monitoring data. Differences between modelled and monitored data may occur as a result of uncertainties associated with a number of model inputs including:

- traffic flows, speeds and vehicle splits
- emissions estimates
- background concentrations
- meteorological data
- surface roughness length and terrain

11.1.26 The verification process benefits an assessment by investigating uncertainties and minimising them either through informed refinement of model input parameters or adjustment of the model output if it is deemed necessary.

11.1.27 Guidance produced by the Department for Environment Food and Rural Affairs (Defra)[2] provides a methodology for model verification, including calculation methods and directions on the suitability of monitoring data.

11.1.28 Verification of modelled 2023 annual mean NO_2 concentrations has been undertaken utilising monitoring results from relevant diffusion tube sites within the study area.

11.1.29 Background concentrations used in the model verification have been taken from Defra and, following comparison with background air quality monitoring sites, have been uplifted using the factor discussed in section 11.3 of Chapter 11 (Air Quality) of the Environmental Statement (ES).

11.1.30 The background maps for NOx concentrations are split into source sectors. Selected ‘in-grid’ road sectors were removed from the

background NOx and NO_2 concentration estimates using Defra's sector removal tool[3] to avoid double counting of road traffic emissions in the modelling process.

11.1.31 The adjusted background concentrations used for the verification are presented in Table D-1 below.

Table D-1 Adjusted Defra background pollutant map data for verification

Grid square (X, Y)	2023 NO_2 background concentration ($\mu g/m^3$)
330500, 367500	10.2
331500, 368500	11.0
332500, 367500	13.4
332500, 368500	10.7
333500, 368500	10.8
333500, 369500	11.5

Air quality monitoring data

11.1.32 Data from Flintshire County Council and the Scheme-specific monitoring survey (see Appendix C (Air Quality Monitoring Report) of the Air Quality ES Appendices for more detail) was reviewed to determine the suitability of each of the monitoring locations for inclusion in the model verification process. The criteria used to determine the suitability of the monitoring data for inclusion into the verification process were:

- The monitoring site was at a roadside or near a road location within the air quality study area.
- The exact location of the monitoring site could be accurately identified.
- The monitoring site was not influenced by substantial road or other emission sources for which data was not available in the traffic reliability area, and therefore could not be included in the dispersion model.

[3] Defra (2024) NO_2 Adjustment for NOx Sector Removal Tool v9.0 [online] available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/no2-adjustment-for-nox-sector-removal-tool/

- The monitoring site was not affected by local emission sources (for example, from a bus station, car park or buses accelerating from a bus stop).

11.1.33 In total, nine Flintshire County Council monitoring sites and six Scheme-specific monitoring sites were used for verification. The exact location of each of the sites selected has been confirmed using online street photography and from photographs taken during Scheme-specific surveys.

11.1.34 The locations of the monitoring sites used in model verification are indicated in Figure 11.6 (Air Quality Monitoring Locations) of the ES Figures. The Scheme monitoring sites were annualised and bias adjusted in accordance with Defra guidance, as described in Appendix C (Air Quality Monitoring Report) of the Air Quality ES Appendices. Table D-2 presents the monitoring data used within the model verification.

Table D-2 Monitoring data used within model verification

Site ID	OS grid reference		2023 Annual mean NO_2 ($\mu g/m^3$)
	X	Y	
ADDC-008	330793	367434	25.3
ADDC-085	330716	367349	18.3
ADDC-099	330726	367354	21.6
ADDC-116	332519	368899	15.2
ADDC-037	332227	367726	14.3
ADDC-070	331807	368271	16.6
ADDC-104	332558	368750	16.1
ADDC-034	333043	369053	12.9
ADDC-023	331665	368029	19.8
D1	330793	367433	25.6
D2	331944	368152	25.9
D3	331968	368178	25.5
D5	332278	368489	28.4
D7	332403	368651	14.4
D8	332837	368774	11.6

11.1.35 There are no PM_{10} analysers within the study area to enable model verification. Therefore, the NOx adjustment factors have been applied to modelled road PM_{10} contributions, following guidance in Defra TG22.

Results

11.1.36 Table D-3 presents a comparison of the monitored and modelled concentrations of NOx and NO_2 at the diffusion tube sites for the year 2023. There is a systematic underprediction of NO_2 concentrations at 10 of the 15 locations, ranging from 13.9% to 25.0%. At the remaining 5 locations, model overprediction ranges from 0.7% to 29.8%.

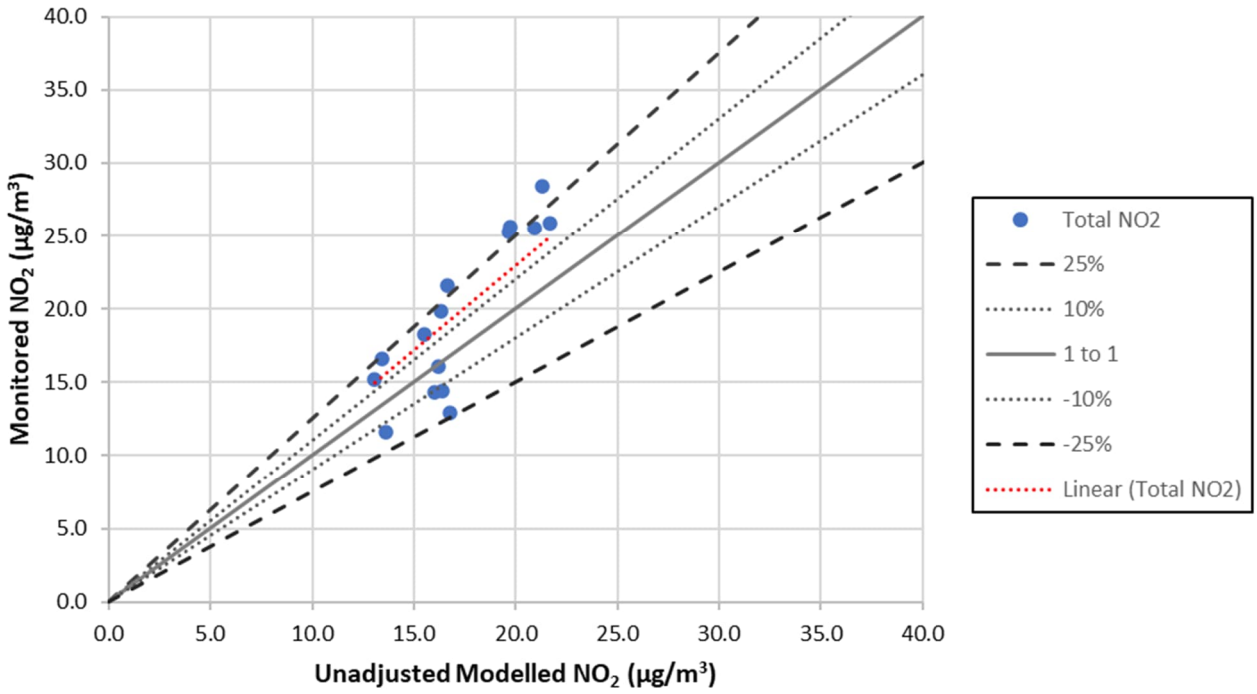
Table D-3 Unadjusted model verification results

Diffusion tube ID	Monitored road NOx (µg/m³)	Modelled road NOx (µg/m³)	Monitored total NO_2 (µg/m³)	Modelled total NO_2 (µg/m³)	Total NO_2 difference (%)
ADDC-008	35.0	20.9	25.3	19.7	-22.3
ADDC-085	17.7	11.3	18.3	15.5	-15.4
ADDC-099	25.6	14.0	21.6	16.7	-22.9
ADDC-116	9.6	5.0	15.2	13.1	-13.9
ADDC-037	1.9	5.6	14.3	16.0	12.0
ADDC-070	12.0	5.1	16.6	13.4	-19.0
ADDC-104	11.6	11.8	16.1	16.2	0.7
ADDC-034	3.0	11.4	12.9	16.8	29.8
ADDC-023	19.4	11.5	19.8	16.4	-17.4
D1	35.8	21.1	25.6	19.7	-22.9
D2	34.6	23.9	25.9	21.7	-16.3
D3	33.6	22.0	25.5	20.9	-18.0
D5	42.1	23.7	28.4	21.3	-25.0
D7	7.8	12.2	14.4	16.4	14.0
D8	1.8	6.0	11.6	13.6	17.2

11.1.37 Table D-3 and Figure D-1 present a comparison of the monitored and modelled concentrations of NOx and NO_2 at the verification sites.

Following Defra guidance, modelled and measured road traffic concentrations have been compared to derive a verification factor to apply to the modelled results. As diffusion tubes only measure total NO_2, the road traffic NOx concentration measured by the diffusion tube was estimated following Defra TG22[2]. Monitored road traffic NOx was estimated using Version 9.1 of the NOx to NO_2 calculator[4] based on the Defra predicted background NO_2.

Figure D-1 Unadjusted model verification (annual mean NO_2 µg/m^3)



11.1.38 Following Defra guidance, a model adjustment factor of 1.50 has been calculated when comparing modelled and monitored road traffic NOx.

11.1.39 Table D-4 and Figure D-2 present the adjusted modelled NO_2 with monitored NO_2 at the verification sites. The model predicts NO_2 concentrations within 10% of the monitored concentrations at 9 of the 15 sites, between 10% and 25% at 3 sites and above 25% at the 3 remaining sites. The largest under-prediction is 12% at site ADDC-070 where the

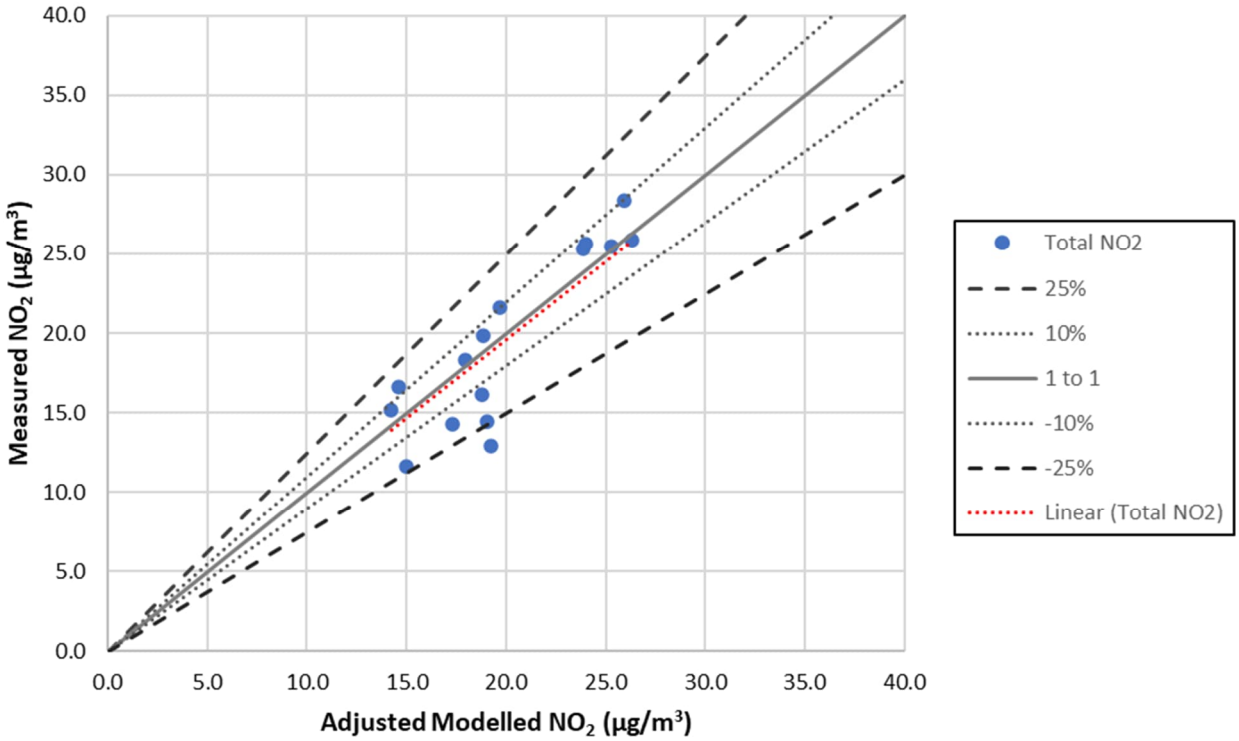
[4] Defra (2024) NOx to NO_2 calculator, Version 9.1 [online] available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/

monitored concentration is 16.6µg/m^3 compared to an adjusted modelled concentration of 14.6µg/m^3. All predictions greater than 25% of the monitored concentration are model over-predictions and would cause increased conservatism in the model output. Overall, it is considered that the model outputs tend towards conservative predictions at these locations following adjustment with a slight tendency to over-predict as discussed below.

Table D-4 Adjusted model verification results

Diffusion tube ID	Monitored total NO_2 (µg/m^3)	Adjusted modelled total NO_2 (µg/m^3)	Total NO_2 difference (%)
ADDC-008	25.3	23.9	-5.6
ADDC-085	18.3	18.0	-1.8
ADDC-099	21.6	19.7	-9.0
ADDC-116	15.2	14.2	-6.4
ADDC-037	14.3	17.3	20.8
ADDC-070	16.6	14.6	-12.0
ADDC-104	16.1	18.8	16.7
ADDC-034	12.9	19.2	49.0
ADDC-023	19.8	18.9	-4.7
D1	25.6	24.0	-6.3
D2	25.9	26.3	1.7
D3	25.5	25.3	-0.9
D5	28.4	26.0	-8.6
D7	14.4	19.1	32.4
D8	11.6	15.0	29.1

Figure D-2 Adjusted model verification (annual mean NO_2 µg/m^3)



11.1.40 Table D-5 presents statistical parameters for describing model uncertainty. The Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. The results of the RMSE calculation in this case are concentrations of NO_2 measured in units of micrograms per metre cubed. Table D-5 shows that before adjustment, the model uncertainty was ±4µg/m^3 or 10% of the annual mean NO_2 objective. After adjustment, the model uncertainty is reduced to ±2.7µg/m^3 or 6.8% of the annual mean NO_2 objective. Therefore, the model uncertainty is well within the desired 10% of the relevant objective, as recommended by Defra guidance.

11.1.41 Fractional Bias (FB) is used to identify if the model shows a tendency to over or under predict and values can vary between +2 and -2 and have an ideal value of 0. Negative values suggest a model over- prediction and positive values suggest a model under-prediction. Table D-5 shows that, before adjustment, the model tends to under-predict annual mean NO_2

concentrations. Following adjustment, the model is very close to the desired FB value of 0 with a very slight tendency to over-predict.

11.1.42 The correlation coefficient (R) is used to measure the linear relationship between modelled and measured data. A value of zero means no relationship and a value of 1 means absolute relationship. Following model adjustment, the value of R increases from 0.86 to 0.88.

Table D-5 Description of model uncertainty

Statistic parameter	Before adjustment	After adjustment	Ideal value
Root mean square error	4.00	2.70	0
Fractional bias	0.12	-0.03	0
Correlation coefficient	0.86	0.88	1

11.1.43 The statistical analysis above demonstrates that the model performs adequately versus monitoring data, following adjustment. An adjustment factor of 1.50 has therefore been applied to both modelled road NOx and PM_{10} contributions at all receptors.

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 12: Noise and Vibration Appendix A: Baseline

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12. A. Baseline

12.1 Measurement procedure

12.1.1 A noise survey was undertaken between 13 November 2024 and 23 December 2024. The survey comprised of both unattended, continuous long-term (LT) measurements, and attended, short-term (ST) measurements. ST measurements were carried out on the 13 November 2024 and 16 December 2024. LT measurements captured levels between the 13 November 2024 and 23 December 2024 for a period of 7 days at each LT location.

12.1.2 Sound level meters (SLMs) were fitted with the relevant windshields suitable for outdoor use and positioned the microphone at a height of 1.4m above ground level. All measurements were undertaken in free-field conditions at least 3.5m away from any façades. SLMs were configured to measure using fast time weighting and both A and Z-frequency weighting.

12.1.3 All measurements were undertaken by an acoustic engineer competent in environmental noise monitoring and were completed in accordance with the principles set out in BS 7445-1:2003[1]. The calibration of each sound level meter was checked before and after measurements using the acoustic calibrator at 94 dB at 1kHz. No variations of greater than 0.3 dB were noted, which is within the tolerance range. The SLM used conform to the requirements of BS EN 61672-1:2013[2] . The calibrator used conforms to the requirements of BS EN 60942: 2003[3]. Details of the equipment used are presented in Table 12-1.

12.1.4 Noise levels were measured in decibels for a range of stated descriptors that are defined below.

- L_{AFmax} – the highest value of the A-weighted sound pressure levels with a specified time weighting that occurs during a given event.

[1] British Standards Institution, 2003. BS7445 Description and measurement of environmental noise Part 1 Guide to quantities and procedures
[2] British Standards Institution, 2013. BS EN 61672 Electroacoustics. Sound level meters Part 1 Specifications
[3] British Standards Institution, 2003. BS EN 60942 Electroacoustics. Sound calibrators

- $L_{Aeq,T}$ – also referred to as the continuous equivalent noise level, it is the A-weighted sound pressure level that is the same amount of sound energy as the time varying noise over the same period of time (T).
- $L_{A10,T}$ –the A-weighted sound pressure level that is exceeded for 10% of a given time interval (T).
- $L_{A90,T}$ – also referred to as the background sound level, it is the A-weighted sound pressure level that is exceeded for 90% of a given time interval (T).

12.1.5 A-weighting –this is a frequency weighting designed to mimic the frequency response of the human ear by providing a correction for the frequencies at which the human ear is less sensitive.

Table 12-1 Inventory of Noise Measurement Equipment

Item	Make & Model	Serial Number	Calibrated
Calibrated	Rion NC75	34913593	21-Feb-2024
Sound Level Meter (SLM) 1	Rion NL-52	754168	06-Feb-2024
Sound Level Meter (SLM) 2	Rion NL-52	898308	06-Dec-2023

Source: Mott MacDonald

12.2 Measurement locations

12.2.1 Details of the measurement locations are provided in Table 12-2. Noise measurement positions in relation to the proposed A494 road alignment and new Dee Bridge are represented in Volume 2, Figure 12.8. Photographs of each measurement location can be found in Section 12.7 below.

Table 12-2 Noise measurement locations

Measurement location reference	Location description	'what3words' location reference	Measurement duration
LT1	Rear garden of 13 Claremont Avenue, Garden City	///misfits.craters.blush	1 week
LT2	Rear garden of 51 Dundas Street, Queensferry	///guides.excuse.enthused	1 week
ST1	Corner of Queen Street, Queensferry	///until.polices.sends	15min x5

Measurement location reference	Location description	'what3words' location reference	Measurement duration
ST2	Access Road to Traveller Site, Queensferry	///irony.watching.guidebook	15min x2
ST3	Junction of Claremont Avenue and Weston Close, Garden City	///afterglow.dandelions.breed	15min x5
ST4	Adjacent to Drybridge Farm, Chester Road, Deeside	///aced.clearly.selection	15min x5

Source: Mott MacDonald + https://what3words.com

12.3 Existing acoustic environment

Detailed notes on the position and acoustic conditions at each of the six measurement locations during the measurement intervals are presented below.

LT-1: 13 Claremont Avenue

12.3.1 LT-1 was a free field location situated in the enclosed rear garden of 13 Claremont Avenue. The garden faces southwest toward the River Dee with a flood embankment carrying the Wales Coastal Path immediately adjacent and elevated with respect to the garden. The garden has direct line of sight to traffic crossing the existing A494 River Dee bridge. The measurement location was afforded some shielding from traffic noise by garden fences and outbuildings. The dominant noise source at the measurement location was road traffic noise emanating from the A494, with occasional contribution from aviation noise associated with Hawarden Airport situated some 4km to the southeast.

LT-2: Dundas Street

12.3.2 The LT-2 measurement location was situated at the southern end of Dundas Street, accessible from Station Road (B5441). The measurement equipment was stationed in the rear garden of 51 Dundas Street, approximately 12m from the eastbound carriageway of the A494. Two masonry walls, separated by an access track were situated between the measurement location and the A494: the rear

garden wall to 51 Dundas Street which is approximately 1.4m in height and topped with approximately 500mm close boarded timber; and the wall separating the access from the A494 which is approximately 1.9m high. Together these largely broke line of sight between the measurement location and the A494. Due to the constrained nature of the garden, it was not practical to situate the sound level meter 3.5m from all reflecting surfaces. So the measurement location was not truly free field. The acoustic environment, however, was observed to be generally consistent across the width of the garden, no correction has therefore been applied to the data reported below for LT1 accounting for façade type reflections. The dominant noise source was road traffic on the A494. Occasional neighbourhood noise was noted; however, this was considered negligible.

ST-1: Queens Street

12.3.3 ST-1 was located on the south-western end of Queen Street, at the intersection with Chester Road East. The measurement location was approximately 35m from the eastbound carriageway of the A494. The dominant noise source was road traffic on the A494. Subsidiary noise was noted from road traffic on the B5441 Station Road, some 110m to the northwest. Occasional cars passing by on Queen Street were noted.

ST-2: Access Road to Traveller Site

12.3.4 ST-2 was situated on Riverside Way, accessible from the A494. This road provides access to industrial units, gypsy and travellers site, as well as Queensferry surface water pumping station. The measurement location is approximately 50m from the westbound carriageway of the A494. The chief noise source at ST-2 is road traffic noise on the A494. Subsidiary noise was noted from occasional cars accessing the traveller's site; however, this was considered negligible, due to the A494 road traffic masking other noise sources in the vicinity.

ST-3: Junction of Claremont Avenue and Weston Close

12.3.5 ST-3 was positioned on the pedestrian footway of Claremont Avenue, at the intersection with Weston Close. The eastbound carriageway of the A494, elevated in relation to ST-3, was approximately 25m away. An existing 2 metres noise

barrier is situated between ST-3 and the A494, breaking the direct line of sight between the measurement location and the road. The dominant noise source at ST-3 was road traffic on the A494. Subsidiary noise was noted from distant construction works to the west of ST-3, approximately 180m away. Other subsidiary noise included occasional cars passing on Claremont Avenue and children playing during the school break at Sealand Primary School. Occasional high-altitude overhead aircraft also contributed to subsidiary noise levels.

ST-4: Adjacent to Drybridge Farm

12.3.6 ST-4 was located on an access road off Chester Road East, adjacent to Drybridge Farm. The measurement location was located in direct line of sight to the A494, approximately 75m away to the northwest. The noise climate at ST-4 is dominated by road traffic noise on the A494, with subsidiary noise from flowing road traffic on the B5129 Chester Road East.

12.4 Measurement conditions

12.4.1 Weather data during noise measurement periods was captured whilst on-site. A portable meteorological station was installed at each long term measurement location for the duration of the survey. Further observations were made during the attended noise surveys. Detailed meteorological measurements are presented in Section 12-9. Periods where weather conditions were considered non-ideal have been highlighted in grey.

12.4.2 The weather conditions throughout the acoustic surveys between 13th November 2024 and 23rd December 2024 varied. Attended noise measurements at ST-1 to ST-4 were captured during periods of ideal weather conditions, when conditions were dry with wind speeds below 5 m/s. At unattended measurement locations (LT-1 and LT-2), periods of rainfall were noted across multiple days during the 7 day measurement periods at each unattended measurement location. Upon inspection, these periods of rainfall were observed not to affect noise levels captured, therefore periods of non-ideal weather conditions have been included in the noise measurement results.

12.5 Measurement results

12.5.1 This section provides the broadband noise data results for unattended (LT-1 and LT-2) and attended measurements (ST-1 to ST-4) that were carried out between 13th November 2024 and 23rd December 2024 . A minimum of two sets of 15-minute measurements were taken at each of the attended measurement location. Unattended measurement locations captured noise levels over the course of seven days, to understand the variability across the day and night, as well as on different days. LT-1 measurements were captured between 16 and 23 December 2024. LT-2 measurements were captured between 13 and 20 November 2024.

12.5.2 All measurement locations are considered representative of nearby noise sensitive receptors (NSRs).

12.5.3 Periods where meteorological conditions were deemed not ideal for noise measurements, due to rainfall, have been highlighted on Figure 4.1 and Figure 4.2. Upon analysis of the measurement data, it was determined that weather effects did not significantly alter noise levels, when compared to those recorded under ideal noise measurement conditions. Consequently, these measurements are considered valid and have been included in the final results. Appendix D presents the meteorological measurements that were captured during the measurement intervals.

Unattended long term noise measurement results

Table 12-3 Noise measurement at LT1, 13 Claremont Avenue (free-field)

Weekday	Date	Daytime $L_{Aeq,16hrs}$ (dB)	Night-time $L_{Aeq,8hrs}$ (dB)	$L_{A10,18hrs}$ (dB)
Monday	16.12.2024	-	52.5	-
Tuesday	17.12.2024	59.8	55.9	61.7
Wednesday	18.12.2024	57.7	51.6	61.9
Thursday	19.12.2024	55.5	53.3	57.6
Friday	20.12.2024	58.7	52.5	61.3
Saturday	21.12.2024	57.8	52.2	59.7
Sunday	22.12.2024	57.4	48.9	59.9

Source: Mott MacDonald

Figure 12-1 Figure 12-A1: Graph of unattended noise measurements at LT1

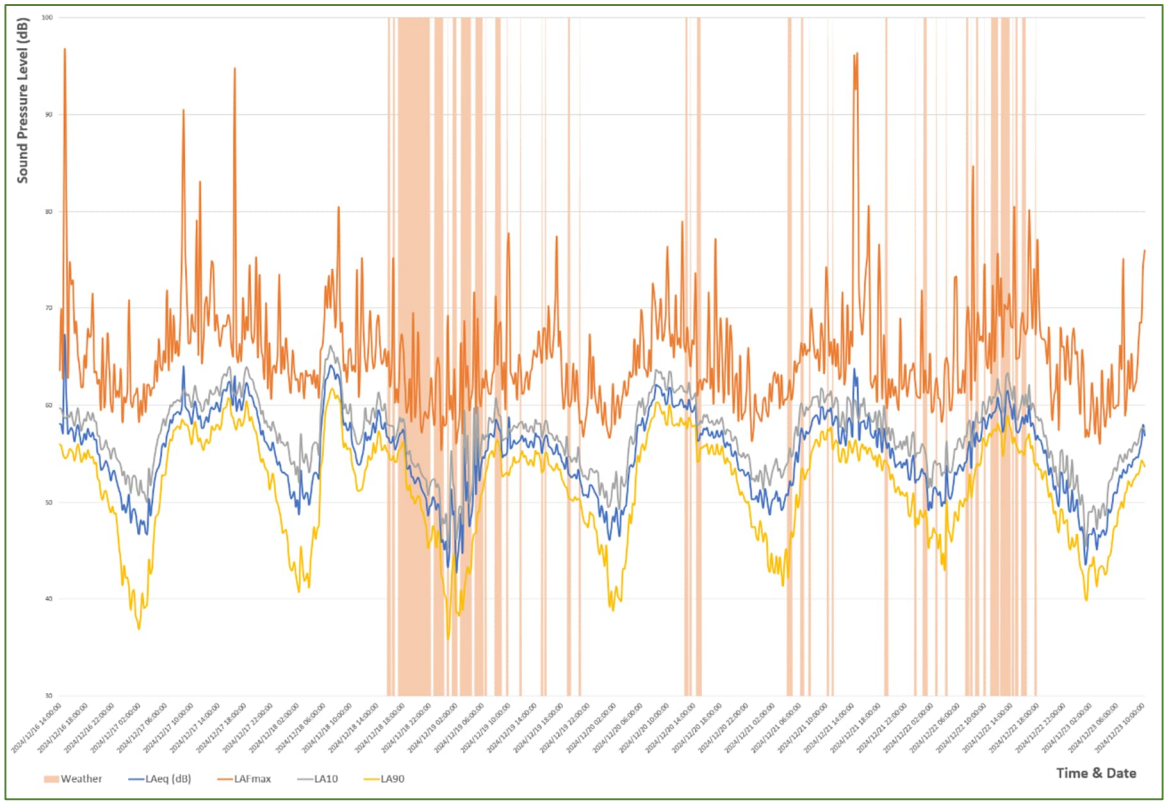
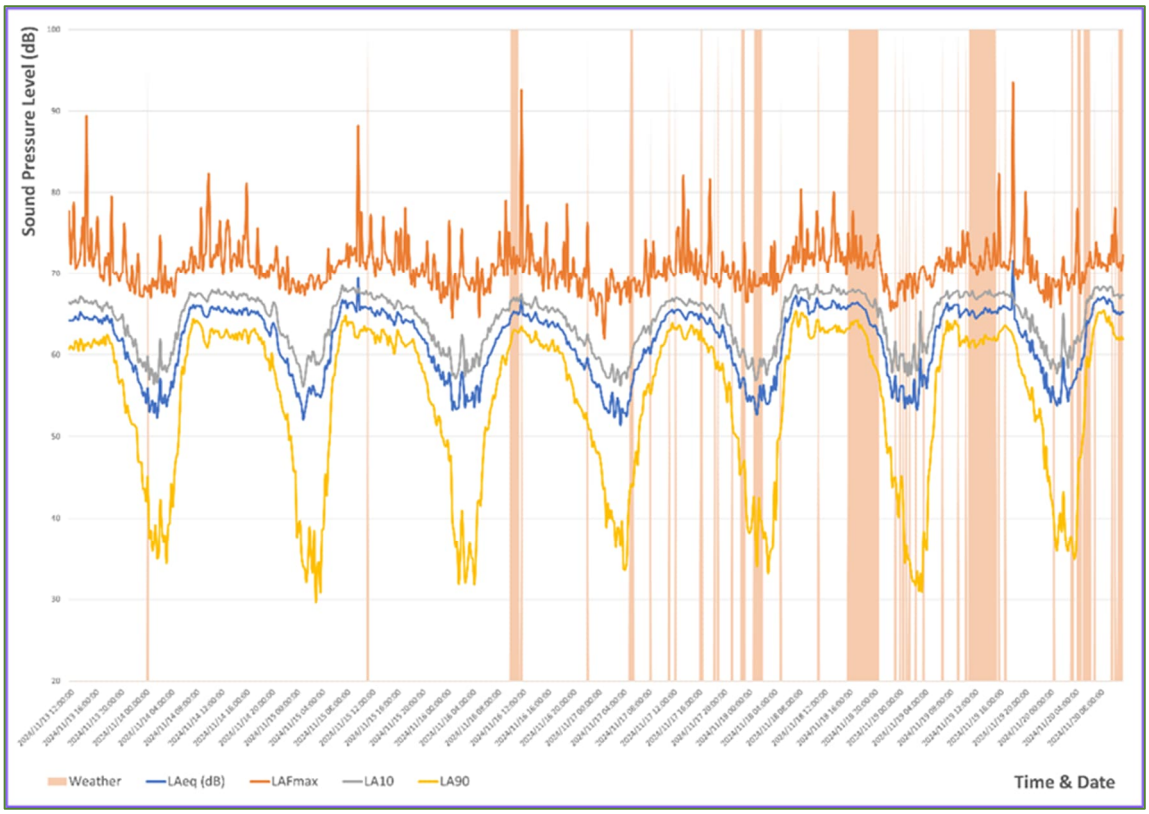


Table 12-4 Noise measurements at LT2, 51 Dundas Street (free-field)

Weekday	Date	Daytime $L_{Aeq,16hrs}$ (dB)	Night-time $L_{Aeq,8hrs}$ (dB)	$L_{A10,18hrs}$ (dB)
Wednesday	13.11.2024	-	59.2	-
Thursday	14.11.2024	64.6	59.3	66.9
Friday	15.11.2024	64.5	56.7	66.8
Saturday	16.11.2024	63.2	55.7	67.8
Sunday	17.11.2024	63.4	60.0	67.7
Monday	18.11.2024	65.2	59.6	69.4
Tuesday	19.11.2024	64.8	60.1	69.0

Source: Mott MacDonald

Figure 12-A2: Graph of unattended noise measurements at LT1



Attended short-term noise measurement results

Table 12-5 Noise measurements at LT2, 51 Dundas Street (free-field)

Location	Date	Start time	End time	$L_{Aeq,15min}$ (dB)	$L_{AFmax,15min}$ (dB)	$L_{A10,15min}$ (dB)	$L_{A90,15min}$ (dB)
ST1	13.11.2024	11:51	12:06	57.9	71.8	59.4	55.6
	13.11.2024	14:12	14:27	59.4	78.8	60.7	57.2
	13.11.2024	15:20	15:35	59.9	72.5	61.2	57.0
	14.11.2024	10:28	10:43	58.6	65.4	60.2	56.1
	20.11.2024	11:20	11:35	60.2	74.7	61.3	58.1
	13.11.2024	11:05	11:20	65.9	81.0	67.4	63.4
ST2	16.12.2024	13:07	13:22	66.5	74.5	68.1	64.4
	16.12.2024	12:46	13:01	60.3	70.5	61.7	58.2
ST3	13.11.2024	14:58	15:13	61.0	77.0	62.1	58.7
	13.11.2024	15:49	16:04	61.1	70.9	62.3	59.0
	13.11.2024	11:21	11:26	64.1	74.7	65.5	62.2
	14.11.2024	10:36	10:51	62.3	71.8	63.6	60.4
	20.11.2024	12:12	12:27	62.2	77.8	63.6	59.4
ST4	13.11.2024	14:32	14:47	62.1	66.2	63.6	60.4
	13.11.2024	16:14	16:29	60.8	73.3	62.0	59.0
	13.11.2024	10:54	11:09	61.2	81.4	61.3	56.5
	14.11.2024	11:00	11:15	62.7	72.5	64.2	60.8
	20.11.2024	11:51	12:06	57.9	71.8	59.4	55.6

Source: Mott MacDonald

12.6 Measurement location classification

12.6.1 The daytime, evening and night baseline noise ABC categories (as stated in BS 5228 Part 1: 2009+A1:2014) have been assigned for all noise measurement locations. These categories have been displayed in Table 4.4.

Table 12-6 Measurement location category

Measurement location ID	*Assumed ABC Category*		
	Day	Evening	Night
LT1	A	B	C
LT2	B	C	C
ST1	A	-	-

Measurement location ID	*Assumed ABC Category*		
	Day	**Evening**	**Night**
ST2	B	-	-
ST3	A	-	-
ST4	A	-	-

Source: Mott MacDonald

Uncertainty in acoustic measurements

12.6.2 Inevitably there is a degree of uncertainty in measured noise levels. Contributory factors to these uncertainties include tolerances in instrumentation readings, meteorological conditions, and the inherent variation in the acoustic environment during the course of the measurement period. Any acoustic measurement is a snapshot of the noise climate at the time of the measurement. Every effort has been made to limit uncertainty in the measurements reported.

12.6.3 Measures taken to limit uncertainty:

- Undertaking surveys with appropriately qualified and trained acoustic engineers;
- Use of measurement equipment calibrated to appropriate standards by accredited bodies and calibrated on site using a reference sound source;
- Following best practice methodology for environment noise measurement set out in BS 7445-1:2003;
- Measuring under appropriate meteorological conditions; and
- Measuring at time and locations in line with industry guidance

12.7 Photographs of measurement locations

Photo 12-1: Unattended measurement at LT1: 13 Claremont Avenue

Photo 12-2: Unattended measurement at LT1: 13 Claremont Avenue

Photo 12-3: Attended measurements at ST1: Queen Street

Photo 12-4: Attended measurements at ST2:

Photo 12-5: Attended measurements at ST3: Claremont Avenue

Photo 12-6: Attended measurements at ST4: Chester Road East

12.8 Detailed noise measurements

Table 12-7 Unattended noise measurement data at LT-1 location

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
16.12.2024 – 14:00	58.1	63.6	59.7	56.0
16.12.2024 – 14:15	58.0	69.9	59.6	55.8
16.12.2024 – 14:30	57.2	63.4	59.0	55.0
16.12.2024 – 14:45	67.2	96.2	58.7	54.6
16.12.2024 – 15:00	61.3	82.8	58.7	54.6
16.12.2024 – 15:15	57.1	62.9	59.0	54.9
16.12.2024 – 15:30	57.4	74.6	58.8	55.5
16.12.2024 – 15:45	57.7	72.4	59.3	55.4
16.12.2024 – 16:00	57.3	72.8	58.4	55.1
16.12.2024 – 16:15	56.3	67.5	57.9	54.3
16.12.2024 – 16:30	57.4	68.6	58.8	55.2
16.12.2024 – 16:45	58.0	65.3	59.7	56.0
16.12.2024 – 17:00	57.1	64.0	58.5	55.3
16.12.2024 – 17:15	56.0	61.9	57.4	54.2
16.12.2024 – 17:30	56.3	61.9	58.0	54.5
16.12.2024 – 17:45	57.1	65.1	58.6	55.1
16.12.2024 – 18:00	56.5	63.9	58.4	54.5
16.12.2024 – 18:15	57.6	67.8	59.3	55.4
16.12.2024 – 18:30	57.0	67.0	58.8	54.8
16.12.2024 – 18:45	56.8	67.2	58.5	54.6
16.12.2024 – 19:00	57.2	71.4	59.2	54.7
16.12.2024 – 19:15	56.5	63.4	58.4	54.0
16.12.2024 – 19:30	56.5	63.5	58.3	54.1
16.12.2024 – 19:45	55.1	62.2	56.9	52.5
16.12.2024 – 20:00	54.9	62.6	56.8	52.2
16.12.2024 – 20:15	53.4	59.6	55.5	50.8
16.12.2024 – 20:30	53.5	66.9	55.5	50.3
16.12.2024 – 20:45	53.9	59.9	55.8	51.1
16.12.2024 – 21:00	54.3	62.6	56.4	51.2
16.12.2024 – 21:15	53.9	67.4	55.7	50.4
16.12.2024 – 21:30	53.2	64.0	55.4	49.5
16.12.2024 – 21:45	52.3	60.1	54.5	49.0
16.12.2024 – 22:00	53.1	59.4	55.4	49.6
16.12.2024 – 22:15	53.3	64.2	55.6	48.9
16.12.2024 – 22:30	52.6	60.9	54.8	48.9
16.12.2024 – 22:45	51.9	61.5	54.4	47.3
16.12.2024 – 23:00	51.3	60.9	54.2	45.3
16.12.2024 – 23:15	50.7	63.7	53.8	43.9
16.12.2024 – 23:30	49.3	58.3	52.8	41.4
16.12.2024 – 23:45	49.8	60.8	53.2	43.4
17.12.2024 – 00:00	49.0	60.3	51.9	42.2
17.12.2024 – 00:15	49.8	61.6	52.8	42.2
17.12.2024 – 00:30	50.8	70.8	52.5	41.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
17.12.2024 – 00:45	48.0	60.6	51.0	38.9
17.12.2024 – 01:00	49.1	59.8	52.5	40.6
17.12.2024 – 01:15	49.4	60.9	52.8	40.9
17.12.2024 – 01:30	48.9	61.2	52.6	38.3
17.12.2024 – 01:45	47.7	61.7	51.3	37.8
17.12.2024 – 02:00	46.7	58.3	50.8	36.9
17.12.2024 – 02:15	48.2	60.5	52.3	38.2
17.12.2024 – 02:30	47.8	59.0	51.1	40.6
17.12.2024 – 02:45	48.1	62.2	51.1	39.1
17.12.2024 – 03:00	47.0	59.3	50.5	39.2
17.12.2024 – 03:15	46.7	62.1	50.1	39.5
17.12.2024 – 03:30	50.4	62.1	53.5	44.0
17.12.2024 – 03:45	48.7	61.0	51.8	42.6
17.12.2024 – 04:00	50.1	61.8	53.0	43.2
17.12.2024 – 04:15	51.7	61.8	54.2	46.4
17.12.2024 – 04:30	52.8	64.6	55.3	48.5
17.12.2024 – 04:45	53.4	62.5	56.2	48.7
17.12.2024 – 05:00	53.7	66.8	56.9	49.1
17.12.2024 – 05:15	54.4	64.0	57.2	50.7
17.12.2024 – 05:30	55.8	63.6	58.0	52.8
17.12.2024 – 05:45	56.1	65.6	58.6	52.8
17.12.2024 – 06:00	55.8	64.5	57.9	52.9
17.12.2024 – 06:15	57.0	71.8	58.8	54.4
17.12.2024 – 06:30	57.5	63.6	59.2	55.7
17.12.2024 – 06:45	58.5	69.9	60.0	56.5
17.12.2024 – 07:00	58.2	64.5	59.9	56.4
17.12.2024 – 07:15	59.0	69.2	60.3	57.4
17.12.2024 – 07:30	59.1	65.4	60.3	57.5
17.12.2024 – 07:45	59.3	66.6	60.5	57.8
17.12.2024 – 08:00	59.3	65.1	60.5	57.8
17.12.2024 – 08:15	59.1	68.4	60.4	57.6
17.12.2024 – 08:30	59.9	76.3	61.1	58.5
17.12.2024 – 08:45	64.0	90.5	61.6	58.3
17.12.2024 – 09:00	60.0	76.7	61.4	58.0
17.12.2024 – 09:15	59.6	71.3	61.0	58.0
17.12.2024 – 09:30	59.4	66.4	61.1	57.6
17.12.2024 – 09:45	58.8	66.4	60.4	56.7
17.12.2024 – 10:00	58.1	69.3	59.8	56.0
17.12.2024 – 10:15	59.5	67.8	61.1	57.5
17.12.2024 – 10:30	60.4	67.6	62.0	58.3
17.12.2024 – 10:45	59.5	79.1	61.0	57.3
17.12.2024 – 11:00	58.6	65.2	60.4	56.3
17.12.2024 – 11:15	58.9	83.1	60.2	56.6
17.12.2024 – 11:30	57.7	64.5	59.4	55.9
17.12.2024 – 11:45	57.7	66.4	59.5	55.4
17.12.2024 – 12:00	58.4	70.5	60.4	56.1
17.12.2024 – 12:15	58.8	71.1	60.6	56.5

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
17.12.2024 – 12:30	58.3	68.2	60.1	56.1
17.12.2024 – 12:45	59.4	71.2	61.5	56.3
17.12.2024 – 13:00	59.8	74.9	61.2	57.8
17.12.2024 – 13:15	59.6	74.4	61.1	57.5
17.12.2024 – 13:30	59.7	67.8	61.3	57.5
17.12.2024 – 13:45	60.3	69.3	61.9	58.0
17.12.2024 – 14:00	59.8	68.0	61.5	57.9
17.12.2024 – 14:15	59.4	66.1	61.0	57.5
17.12.2024 – 14:30	60.6	67.1	62.4	58.1
17.12.2024 – 14:45	61.5	68.2	63.0	59.6
17.12.2024 – 15:00	61.6	68.1	63.2	59.7
17.12.2024 – 15:15	61.5	68.3	63.0	59.9
17.12.2024 – 15:30	62.3	69.3	63.7	60.7
17.12.2024 – 15:45	62.4	68.6	63.9	60.6
17.12.2024 – 16:00	60.8	66.0	62.4	59.0
17.12.2024 – 16:15	60.1	65.1	61.3	58.7
17.12.2024 – 16:30	63.0	94.8	61.2	57.9
17.12.2024 – 16:45	59.5	65.5	61.0	57.5
17.12.2024 – 17:00	60.2	64.4	61.6	58.4
17.12.2024 – 17:15	60.6	66.3	62.3	58.6
17.12.2024 – 17:30	59.5	64.7	60.8	57.9
17.12.2024 – 17:45	60.2	71.0	61.8	58.1
17.12.2024 – 18:00	61.4	66.8	63.2	58.9
17.12.2024 – 18:15	62.3	69.1	63.9	60.4
17.12.2024 – 18:30	61.9	67.8	63.6	59.6
17.12.2024 – 18:45	61.0	74.5	62.9	58.4
17.12.2024 – 19:00	61.0	67.6	62.7	58.8
17.12.2024 – 19:15	60.6	66.4	62.5	58.1
17.12.2024 – 19:30	59.9	67.6	61.7	57.5
17.12.2024 – 19:45	59.7	75.3	61.3	57.2
17.12.2024 – 20:00	58.8	64.9	60.8	56.2
17.12.2024 – 20:15	58.1	73.4	60.1	55.0
17.12.2024 – 20:30	57.0	66.0	59.1	54.2
17.12.2024 – 20:45	57.4	64.9	59.4	54.5
17.12.2024 – 21:00	56.4	62.9	58.2	53.8
17.12.2024 – 21:15	56.2	70.5	58.4	53.4
17.12.2024 – 21:30	55.9	61.8	57.8	53.2
17.12.2024 – 21:45	55.5	66.4	57.8	51.4
17.12.2024 – 22:00	55.4	60.7	57.4	52.1
17.12.2024 – 22:15	56.2	63.8	58.3	53.0
17.12.2024 – 22:30	55.4	64.1	57.7	52.0
17.12.2024 – 22:45	54.6	63.4	57.1	50.4
18.12.2024 – 23:00	53.9	65.8	56.1	49.9
18.12.2024 – 23:15	54.2	73.4	57.1	49.2
18.12.2024 – 23:30	53.4	63.5	56.2	48.3
18.12.2024 – 23:45	53.1	66.0	56.2	46.9
18.12.2024 – 00:00	53.1	63.7	55.9	47.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
18.12.2024 – 00:15	52.9	66.9	55.9	47.2
18.12.2024 – 00:30	52.8	64.7	56.2	46.0
18.12.2024 – 00:45	51.6	62.4	55.0	43.8
18.12.2024 – 01:00	50.5	61.4	54.0	43.0
18.12.2024 – 01:15	50.7	65.6	54.0	43.0
18.12.2024 – 01:30	51.1	63.7	54.2	43.8
18.12.2024 – 01:45	49.6	62.6	52.9	42.5
18.12.2024 – 02:00	50.3	62.7	53.7	41.5
18.12.2024 – 02:15	48.9	61.4	52.2	40.8
18.12.2024 – 02:30	53.3	63.3	57.0	45.3
18.12.2024 – 02:45	51.1	63.2	54.7	43.6
18.12.2024 – 03:00	50.4	60.7	54.1	41.9
18.12.2024 – 03:15	51.0	63.5	55.0	42.1
18.12.2024 – 03:30	51.0	63.0	54.3	42.6
18.12.2024 – 03:45	49.8	63.1	53.1	41.2
18.12.2024 – 04:00	50.8	63.1	54.0	44.1
18.12.2024 – 04:15	52.2	62.2	55.7	45.8
18.12.2024 – 04:30	53.0	63.6	56.1	47.5
18.12.2024 – 04:45	53.1	61.8	56.2	46.2
18.12.2024 – 05:00	52.9	63.1	56.0	47.4
18.12.2024 – 05:15	52.5	60.8	55.0	47.7
18.12.2024 – 05:30	56.8	65.6	59.1	53.4
18.12.2024 – 05:45	58.8	66.0	61.4	54.4
18.12.2024 – 06:00	60.5	68.0	62.8	57.0
18.12.2024 – 06:15	62.6	72.2	64.7	59.3
18.12.2024 – 06:30	62.8	70.0	64.7	60.1
18.12.2024 – 06:45	63.4	73.3	65.3	60.7
18.12.2024 – 07:00	64.1	70.0	66.1	61.4
18.12.2024 – 07:15	63.9	74.0	65.6	61.7
18.12.2024 – 07:30	63.6	71.6	65.3	61.4
18.12.2024 – 07:45	62.7	68.0	64.3	60.7
18.12.2024 – 08:00	63.2	73.2	64.9	61.0
18.12.2024 – 08:15	62.9	80.4	64.3	60.7
18.12.2024 – 08:30	61.9	67.6	63.4	60.1
18.12.2024 – 08:45	59.7	68.5	61.3	57.5
18.12.2024 – 09:00	58.0	63.6	59.7	55.7
18.12.2024 – 09:15	58.2	64.2	60.1	56.1
18.12.2024 – 09:30	57.5	62.4	59.2	55.5
18.12.2024 – 09:45	57.5	65.6	59.2	55.6
18.12.2024 – 10:00	58.2	65.8	60.1	55.5
18.12.2024 – 10:15	56.2	63.6	58.0	54.0
18.12.2024 – 10:30	55.6	64.1	57.5	53.3
18.12.2024 – 10:45	55.1	63.5	56.8	52.8
18.12.2024 – 11:00	54.2	73.9	56.1	51.4
18.12.2024 – 11:15	53.9	61.1	56.0	51.2
18.12.2024 – 11:30	54.0	64.6	56.2	51.3
18.12.2024 – 11:45	54.7	75.2	56.8	51.4

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
18.12.2024 – 12:00	55.5	67.7	57.6	52.2
18.12.2024 – 12:15	57.2	64.5	59.7	53.3
18.12.2024 – 12:30	56.4	63.5	58.4	53.7
18.12.2024 – 12:45	56.8	66.1	58.4	54.8
18.12.2024 – 13:00	56.5	69.7	58.1	54.4
18.12.2024 – 13:15	57.3	65.7	59.4	54.6
18.12.2024 – 13:30	58.2	63.8	59.7	56.1
18.12.2024 – 13:45	57.2	64.6	58.7	55.1
18.12.2024 – 14:00	58.4	68.3	60.1	55.9
18.12.2024 – 14:15	59.5	69.2	61.3	57.3
18.12.2024 – 14:30	59.0	66.1	60.6	56.9
18.12.2024 – 14:45	57.7	64.3	59.5	55.4
18.12.2024 – 15:00	57.6	64.6	59.5	55.5
18.12.2024 – 15:15	58.2	65.8	60.1	55.9
18.12.2024 – 15:30	56.8	64.0	58.1	55.3
18.12.2024 – 15:45	56.7	65.5	58.0	55.1
18.12.2024 – 16:00	56.2	61.9	57.9	54.5
18.12.2024 – 16:15	56.2	63.9	57.9	54.4
18.12.2024 – 16:30	56.8	75.2	57.8	54.8
18.12.2024 – 16:45	55.5	60.4	56.5	54.2
18.12.2024 – 17:00	55.9	61.7	57.0	54.2
18.12.2024 – 17:15	56.6	60.4	57.8	55.3
18.12.2024 – 17:30	57.1	65.3	58.7	55.5
18.12.2024 – 17:45	57.2	67.3	58.3	55.8
18.12.2024 – 18:00	57.5	66.0	58.6	56.2
18.12.2024 – 18:15	56.5	62.5	57.8	54.8
18.12.2024 – 18:30	53.6	59.3	55.3	51.7
18.12.2024 – 18:45	53.5	60.1	55.0	51.3
18.12.2024 – 19:00	53.8	62.7	55.3	51.8
18.12.2024 – 19:15	52.7	58.5	54.2	50.5
18.12.2024 – 19:30	52.6	69.5	54.0	50.6
18.12.2024 – 19:45	52.0	59.0	53.7	49.9
18.12.2024 – 20:00	52.3	60.8	53.7	50.3
18.12.2024 – 20:15	52.6	67.5	54.0	50.7
18.12.2024 – 20:30	52.2	60.7	53.5	50.5
18.12.2024 – 20:45	51.5	57.3	53.0	49.3
18.12.2024 – 21:00	51.1	58.1	52.7	49.0
18.12.2024 – 21:15	50.8	59.3	52.5	48.2
18.12.2024 – 21:30	50.3	59.0	52.3	47.4
18.12.2024 – 21:45	48.7	58.7	50.8	45.3
18.12.2024 – 22:00	49.6	60.2	51.6	45.9
18.12.2024 – 22:15	49.8	62.8	52.2	46.1
18.12.2024 – 22:30	50.6	59.4	52.4	47.6
18.12.2024 – 22:45	50.2	58.1	52.4	47.0
18.12.2024 – 23:00	49.3	63.5	51.6	45.3
18.12.2024 – 23:15	49.9	64.9	51.9	47.1
18.12.2024 – 23:30	49.3	63.3	51.2	46.4

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
18.12.2024 – 23:45	45.9	55.5	47.8	42.5
19.12.2024 – 00:00	46.1	58.8	48.4	42.0
19.12.2024 – 00:15	45.1	57.9	47.9	40.5
19.12.2024 – 00:30	45.9	58.1	48.8	40.0
19.12.2024 – 00:45	43.3	69.2	45.3	35.9
19.12.2024 – 01:00	44.9	59.7	47.5	36.8
19.12.2024 – 01:15	51.3	61.0	55.2	41.0
19.12.2024 – 01:30	48.8	58.6	52.2	43.8
19.12.2024 – 01:45	49.1	63.7	51.3	44.5
19.12.2024 – 02:00	42.9	56.2	46.3	38.7
19.12.2024 – 02:15	44.3	57.3	47.3	38.6
19.12.2024 – 02:30	46.2	58.7	49.6	38.3
19.12.2024 – 02:45	48.9	66.4	49.6	40.9
19.12.2024 – 03:00	44.9	57.1	48	38.9
19.12.2024 – 03:15	55.5	68.6	59.3	40.9
19.12.2024 – 03:30	50.3	62.0	54.1	42.3
19.12.2024 – 03:45	52.1	64.0	56.8	43.3
19.12.2024 – 04:00	47.7	59.6	50.0	42.6
19.12.2024 – 04:15	48.5	60.7	50.7	43.1
19.12.2024 – 04:30	49.7	61.7	51.8	46.0
19.12.2024 – 04:45	57.1	71.6	59.7	46.8
19.12.2024 – 05:00	50.9	59.2	53.9	46.9
19.12.2024 – 05:15	56.6	68.9	59.8	49.0
19.12.2024 – 05:30	52.4	61.3	54.7	49.1
19.12.2024 – 05:45	53.6	59.9	55.6	50.8
19.12.2024 – 06:00	54.7	62.7	57.0	51.1
19.12.2024 – 06:15	54.6	61.8	56.5	52.1
19.12.2024 – 06:30	55.3	63.6	56.9	53.1
19.12.2024 – 06:45	55.4	62.0	56.8	53.7
19.12.2024 – 07:00	56.9	61.2	58.7	54.8
19.12.2024 – 07:15	57.1	61.2	58.6	55.1
19.12.2024 – 07:30	56.9	63.1	58.2	55.3
19.12.2024 – 07:45	56.8	63.8	58.6	54.7
19.12.2024 – 08:00	58.5	71.2	60.7	56.0
19.12.2024 – 08:15	58.2	64.2	59.8	56.4
19.12.2024 – 08:30	57.6	68.2	59.0	56.0
19.12.2024 – 08:45	57.2	68.5	58.8	54.9
19.12.2024 – 09:00	54.7	61.7	56.4	52.7
19.12.2024 – 09:15	54.9	64.4	56.5	52.8
19.12.2024 – 09:30	54.9	59.9	56.6	53.0
19.12.2024 – 09:45	55.3	74.9	56.7	53.1
19.12.2024 – 10:00	58.8	77.6	57.6	52.8
19.12.2024 – 10:15	55.6	63.5	57.3	53.6
19.12.2024 – 10:30	55.8	62.9	57.5	53.8
19.12.2024 – 10:45	56.4	62.2	57.9	54.7
19.12.2024 – 11:00	56.1	63.3	57.8	54.1
19.12.2024 – 11:15	56.1	60.6	57.7	54.2

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
19.12.2024 – 11:30	56.3	65.1	58.1	54.2
19.12.2024 – 11:45	56.5	64.3	58.2	54.7
19.12.2024 – 12:00	56.9	61.2	58.3	55.3
19.12.2024 – 12:15	56.3	61.3	57.6	54.7
19.12.2024 – 12:30	56.6	62.7	58.1	54.8
19.12.2024 – 12:45	55.9	63.4	57.4	54.2
19.12.2024 – 13:00	55.7	61.6	57.3	53.9
19.12.2024 – 13:15	56.3	63.3	57.8	54.4
19.12.2024 – 13:30	56.2	63.9	57.8	54.2
19.12.2024 – 13:45	55.7	65.6	57.2	53.8
19.12.2024 – 14:00	57.1	65.2	58.5	55.3
19.12.2024 – 14:15	56.8	65.0	58.1	55.0
19.12.2024 – 14:30	56.8	67.6	58.1	55.1
19.12.2024 – 14:45	56.4	65.8	58.1	54.4
19.12.2024 – 15:00	55.1	64.4	56.7	53.1
19.12.2024 – 15:15	56.2	67.9	57.4	53.4
19.12.2024 – 15:30	56.8	67.8	58.4	55.1
19.12.2024 – 15:45	56.9	64.8	58.3	55.1
19.12.2024 – 16:00	55.9	70.2	57.2	54.0
19.12.2024 – 16:15	55.7	65.8	57.1	53.8
19.12.2024 – 16:30	55.5	64.9	57.0	53.6
19.12.2024 – 16:45	55.0	66.8	56.6	53.3
19.12.2024 – 17:00	55.2	70.5	56.4	53.5
19.12.2024 – 17:15	56.0	77.4	56.9	54.0
19.12.2024 – 17:30	55.0	66.2	56.3	53.4
19.12.2024 – 17:45	55.0	67.6	56.3	53.4
19.12.2024 – 18:00	54.3	63.0	55.9	52.5
19.12.2024 – 18:15	54.0	59.7	55.5	52.1
19.12.2024 – 18:30	53.5	60.8	54.9	51.7
19.12.2024 – 18:45	54.7	64.3	56.8	51.5
19.12.2024 – 19:00	53.0	60.1	54.8	50.6
19.12.2024 – 19:15	52.8	59.9	54.7	50.4
19.12.2024 – 19:30	52.6	60.8	54.2	50.3
19.12.2024 – 19:45	52.8	64.3	54.5	50.2
19.12.2024 – 20:00	52.9	60.4	54.6	50.6
19.12.2024 – 20:15	52.5	63.6	54.2	50.3
19.12.2024 – 20:30	53.4	60.6	55.7	50.4
19.12.2024 – 20:45	52.4	58.2	53.9	50.3
19.12.2024 – 21:00	51.7	58.4	53.3	49.4
19.12.2024 – 21:15	50.8	56.8	52.7	48.4
19.12.2024 – 21:30	50.8	58.0	52.8	47.9
19.12.2024 – 21:45	50.8	59.2	52.5	47.8
19.12.2024 – 22:00	50.6	61.3	52.4	47.5
19.12.2024 – 22:15	51.8	67.3	53.4	49.0
19.12.2024 – 22:30	51.8	60.7	53.5	48.8
19.12.2024 – 22:45	51.5	65.0	53.2	48.7
19.12.2024 – 23:00	51.1	61.3	53.1	47.4

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
19.12.2024 – 23:15	50.8	60.0	53.3	47.1
19.12.2024 – 23:30	50.4	59.3	53.0	45.3
19.12.2024 – 23:45	48.6	62.0	50.8	44.6
20.12.2024 – 00:00	49.7	59.5	52.0	45.6
20.12.2024 – 00:15	49.0	58.0	51.5	44.6
20.12.2024 – 00:30	48.0	60.3	50.5	43.4
20.12.2024 – 00:45	49.1	58.1	51.2	45.5
20.12.2024 – 01:00	46.9	57.2	49.6	41.6
20.12.2024 – 01:15	46.1	56.7	49.7	39.2
20.12.2024 – 01:30	47.4	57.8	50.5	40.8
20.12.2024 – 01:45	48.6	62.2	52.0	38.8
20.12.2024 – 02:00	48.1	58.1	51.5	40.1
20.12.2024 – 02:15	49.5	59.7	53.2	41.3
20.12.2024 – 02:30	47.9	61.0	50.6	40.3
20.12.2024 – 02:45	46.5	58.7	49.4	40.0
20.12.2024 – 03:00	49.2	60.1	52.6	39.8
20.12.2024 – 03:15	48.8	61.2	51.9	43.1
20.12.2024 – 03:30	49.5	62.5	51.7	43.1
20.12.2024 – 03:45	49.8	61.0	52.4	44.2
20.12.2024 – 04:00	51.8	61.4	54.5	46.4
20.12.2024 – 04:15	53.6	63.4	56.3	48.8
20.12.2024 – 04:30	53.9	62.9	56.8	47.9
20.12.2024 – 04:45	53.7	63.2	56.0	49.9
20.12.2024 – 05:00	54.2	66.8	56.3	49.8
20.12.2024 – 05:15	55.9	63.1	58.3	52.9
20.12.2024 – 05:30	57.9	66.2	59.8	54.8
20.12.2024 – 05:45	58.0	63.9	60.4	54.2
20.12.2024 – 06:00	58.0	69.7	59.8	55.5
20.12.2024 – 06:15	58.7	68.5	60.7	56.0
20.12.2024 – 06:30	57.4	63.9	59.0	55.4
20.12.2024 – 06:45	58.1	63.6	59.8	56.0
20.12.2024 – 07:00	58.8	63.0	60.1	57.2
20.12.2024 – 07:15	59.8	65.7	61.3	57.7
20.12.2024 – 07:30	60.0	63.7	61.3	58.4
20.12.2024 – 07:45	60.5	72.4	61.9	58.7
20.12.2024 – 08:00	60.7	71.4	62.1	58.9
20.12.2024 – 08:15	62.1	69.5	63.6	60.2
20.12.2024 – 08:30	62.0	66.8	63.5	60.3
20.12.2024 – 08:45	61.9	68.8	63.3	60.1
20.12.2024 – 09:00	61.7	70.9	63.4	59.5
20.12.2024 – 09:15	61.0	66.7	62.7	59.1
20.12.2024 – 09:30	61.2	67.3	62.8	59.3
20.12.2024 – 09:45	60.1	69.7	61.6	58.1
20.12.2024 – 10:00	60.3	76.4	61.6	58.0
20.12.2024 – 10:15	61.8	69.1	63.4	60.0
20.12.2024 – 10:30	61.7	66.1	63.4	59.5
20.12.2024 – 10:45	60.1	67.3	61.8	58.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
20.12.2024 – 11:00	59.8	65.0	61.3	57.9
20.12.2024 – 11:15	60.0	71.3	61.4	58.0
20.12.2024 – 11:30	60.0	66.3	61.6	58.1
20.12.2024 – 11:45	60.1	66.9	61.7	57.9
20.12.2024 – 12:00	60.6	66.0	62.0	58.7
20.12.2024 – 12:15	60.5	79.0	61.9	58.3
20.12.2024 – 12:30	59.8	66.4	61.4	58.0
20.12.2024 – 12:45	60.0	65.5	61.4	58.3
20.12.2024 – 13:00	59.6	68.0	61.3	57.6
20.12.2024 – 13:15	60.6	65.6	62.3	58.7
20.12.2024 – 13:30	59.7	64.0	60.9	58.3
20.12.2024 – 13:45	59.3	66.7	60.6	57.8
20.12.2024 – 14:00	59.6	66.3	60.9	57.9
20.12.2024 – 14:15	60.0	73.5	61.2	57.9
20.12.2024 – 14:30	56.4	61.1	58.0	54.2
20.12.2024 – 14:45	56.4	62.3	58.0	54.3
20.12.2024 – 15:00	57.1	62.6	58.4	55.6
20.12.2024 – 15:15	57.0	61.6	58.2	55.6
20.12.2024 – 15:30	57.6	62.7	59.0	55.8
20.12.2024 – 15:45	57.5	62.6	58.8	55.8
20.12.2024 – 16:00	57.7	62.4	59.0	56.0
20.12.2024 – 16:15	57.0	71.6	58.3	55.0
20.12.2024 – 16:30	56.9	61.9	58.2	55.5
20.12.2024 – 16:45	57.3	63.8	58.4	55.9
20.12.2024 – 17:00	56.7	60.5	58.0	55.0
20.12.2024 – 17:15	56.8	77.1	58.1	55.0
20.12.2024 – 17:30	57.4	66.9	58.5	56.0
20.12.2024 – 17:45	56.8	61.4	58.1	55.0
20.12.2024 – 18:00	56.9	68.8	58.4	55.0
20.12.2024 – 18:15	57.4	65.9	58.7	55.8
20.12.2024 – 18:30	56.4	60.3	57.7	54.8
20.12.2024 – 18:45	55.7	63.9	57.0	54.0
20.12.2024 – 19:00	56.2	68.9	57.5	54.6
20.12.2024 – 19:15	55.9	61.1	57.4	54.2
20.12.2024 – 19:30	56.0	68.1	57.3	54.1
20.12.2024 – 19:45	54.9	66.1	56.4	52.9
20.12.2024 – 20:00	54.8	59.3	56.4	53.0
20.12.2024 – 20:15	55.3	62.7	56.8	53.5
20.12.2024 – 20:30	54.6	63.2	56.3	52.3
20.12.2024 – 20:45	53.5	58.4	55.0	51.6
20.12.2024 – 21:00	53.3	65.1	54.9	50.8
20.12.2024 – 21:15	53.4	58.6	54.7	51.1
20.12.2024 – 21:30	53.3	59.1	55.1	50.7
20.12.2024 – 21:45	52.8	59.4	54.6	50.2
20.12.2024 – 22:00	52.9	62.0	54.9	50.0
20.12.2024 – 22:15	53.1	65.9	54.9	50.1
20.12.2024 – 22:30	52.2	60.6	54.1	49.0

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
20.12.2024 – 22:45	50.4	56.4	52.4	47.5
20.12.2024 – 23:00	50.4	57.3	52.5	47.5
20.12.2024 – 23:15	50.4	61.1	52.2	47.5
20.12.2024 – 23:30	50.7	59.4	52.8	46.3
20.12.2024 – 23:45	50.1	59.1	52.2	46.1
21.12.2024 – 00:00	51.3	58.6	53.3	48.1
21.12.2024 – 00:15	50.6	58.4	52.9	47.3
21.12.2024 – 00:30	49.5	60.5	51.4	45.9
21.12.2024 – 00:45	51.4	60.8	53.8	46.9
21.12.2024 – 01:00	50.7	59.4	53.2	46.4
21.12.2024 – 01:15	49.6	58.9	52.5	43.3
21.12.2024 – 01:30	48.8	62.2	51.8	42.8
21.12.2024 – 01:45	50.0	60.4	52.8	44.7
21.12.2024 – 02:00	50.4	62.7	53.5	42.9
21.12.2024 – 02:15	50.5	63.4	54.0	42.7
21.12.2024 – 02:30	51.2	62.3	54.5	44.4
21.12.2024 – 02:45	50.2	63.1	53.3	42.6
21.12.2024 – 03:00	50.5	59.7	53.5	44.3
21.12.2024 – 03:15	49.3	63.1	52.6	42.7
21.12.2024 – 03:30	49.5	60.1	52.9	41.4
21.12.2024 – 03:45	50.3	60.6	53.5	44.2
21.12.2024 – 04:00	50.9	60.6	53.9	45.1
21.12.2024 – 04:15	50.8	61.1	54.2	42.2
21.12.2024 – 04:30	52.2	62.6	55.6	45.1
21.12.2024 – 04:45	51.8	60.6	54.7	47.0
21.12.2024 – 05:00	51.9	61.4	55.0	46.4
21.12.2024 – 05:15	53.9	64.5	57.0	47.9
21.12.2024 – 05:30	55.2	63.4	57.8	50.8
21.12.2024 – 05:45	54.2	64.3	56.9	49.5
21.12.2024 – 06:00	56.2	64.4	59.2	50.7
21.12.2024 – 06:15	57.6	66.4	60.2	53.4
21.12.2024 – 06:30	57.2	65.1	59.5	53.5
21.12.2024 – 06:45	56.5	66.3	58.9	52.4
21.12.2024 – 07:00	57.3	65.2	59.8	52.9
21.12.2024 – 07:15	57.1	65.7	59.5	53.4
21.12.2024 – 07:30	57.3	65.6	59.8	53.5
21.12.2024 – 07:45	57.9	69.9	60.0	55.0
21.12.2024 – 08:00	58.6	67.6	60.8	55.5
21.12.2024 – 08:15	58.8	65.4	60.8	56.0
21.12.2024 – 08:30	59.0	64.8	60.9	56.5
21.12.2024 – 08:45	58.8	65.7	60.9	56.2
21.12.2024 – 09:00	58.1	63.6	59.8	55.8
21.12.2024 – 09:15	59.8	68.3	61.7	57.2
21.12.2024 – 09:30	59.8	66.9	61.5	57.3
21.12.2024 – 09:45	58.6	63.5	60.3	56.5
21.12.2024 – 10:00	58.9	74.0	60.7	56.5
21.12.2024 – 10:15	59.5	71.6	61.1	57.5

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
21.12.2024 – 10:30	59.4	65.2	61.0	57.4
21.12.2024 – 10:45	59.7	66.5	61.4	57.7
21.12.2024 – 11:00	58.0	64.2	59.8	55.5
21.12.2024 – 11:15	58.3	66.8	60.1	56.0
21.12.2024 – 11:30	58.9	64.0	60.8	56.4
21.12.2024 – 11:45	58.5	66.3	60.4	56.1
21.12.2024 – 12:00	56.2	62.7	57.9	54.3
21.12.2024 – 12:15	56.1	63.2	57.8	54.2
21.12.2024 – 12:30	57.7	71.6	59.3	55.5
21.12.2024 – 12:45	57.0	62.3	58.4	55.4
21.12.2024 – 13:00	55.9	63.6	57.4	54.1
21.12.2024 – 13:15	58.2	70.3	60.8	54.5
21.12.2024 – 13:30	58.7	64.3	60.6	56.3
21.12.2024 – 13:45	58.2	67.6	60.1	55.7
21.12.2024 – 14:00	56.9	66.2	58.3	55.1
21.12.2024 – 14:15	63.6	95.8	60.5	55.9
21.12.2024 – 14:30	62.0	92.6	60.4	56.4
21.12.2024 – 14:45	62.8	96.0	59.0	55.2
21.12.2024 – 15:00	56.6	72.1	58.5	54.3
21.12.2024 – 15:15	58.2	69.0	60.1	55.5
21.12.2024 – 15:30	58.3	67.3	59.9	56.0
21.12.2024 – 15:45	58.4	70.3	60.7	55.5
21.12.2024 – 16:00	57.6	73.6	58.9	55.7
21.12.2024 – 16:15	57.8	75.6	59.0	55.0
21.12.2024 – 16:30	59.2	80.1	59.1	55.6
21.12.2024 – 16:45	57.2	62.6	58.6	55.5
21.12.2024 – 17:00	56.8	61.8	58.3	54.8
21.12.2024 – 17:15	56.7	62.5	58.4	54.4
21.12.2024 – 17:30	57.4	63.0	59.3	54.8
21.12.2024 – 17:45	55.7	60.6	57.4	53.7
21.12.2024 – 18:00	57.6	76.3	59.4	54.9
21.12.2024 – 18:15	56.8	70.4	58.7	54.5
21.12.2024 – 18:30	55.2	60.7	56.7	53.3
21.12.2024 – 18:45	57.6	67.2	59.9	54.3
21.12.2024 – 19:00	56.5	62.1	58.4	54.3
21.12.2024 – 19:15	55.6	59.7	57.0	54.0
21.12.2024 – 19:30	56.1	62.7	57.7	53.7
21.12.2024 – 19:45	54.6	60.8	56.4	52.4
21.12.2024 – 20:00	55.6	62.7	57.6	52.9
21.12.2024 – 20:15	54.9	61.0	56.8	52.3
21.12.2024 – 20:30	53.7	61.9	55.5	51.1
21.12.2024 – 20:45	53.9	60.4	55.8	51.4
21.12.2024 – 21:00	54.0	59.6	55.7	51.6
21.12.2024 – 21:15	54.2	68.9	56.3	50.8
21.12.2024 – 21:30	53.6	61.7	55.5	51.1
21.12.2024 – 21:45	54.1	61.9	56.3	50.8
21.12.2024 – 22:00	53.9	64.2	55.9	50.7

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
21.12.2024 – 22:15	54.4	61.0	56.8	51.0
21.12.2024 – 22:30	52.5	62.0	54.9	48.8
21.12.2024 – 22:45	52.4	63.6	54.8	48.6
21.12.2024 – 23:00	54.2	63.6	56.8	49.9
21.12.2024 – 23:15	54.8	64.3	57.2	50.9
21.12.2024 – 23:30	52.1	62.4	54.7	47.6
21.12.2024 – 23:45	52.4	61.0	55.1	48.4
22.12.2024 – 00:00	52.4	60.8	55.1	47.8
22.12.2024 – 00:15	52.8	60.8	55.2	49.2
22.12.2024 – 00:30	53.5	71.8	56.0	48.7
22.12.2024 – 00:45	53.0	61.5	55.8	48.5
22.12.2024 – 01:00	53.0	63.6	55.3	49.2
22.12.2024 – 01:15	51.9	61.4	54.2	48.5
22.12.2024 – 01:30	49.3	61.3	51.6	45.3
22.12.2024 – 01:45	50.1	65.3	52.5	46.3
22.12.2024 – 02:00	49.5	59.3	51.7	46.3
22.12.2024 – 02:15	51.4	59.5	53.9	47.4
22.12.2024 – 02:30	51.6	61.8	54.3	46.9
22.12.2024 – 02:45	51.2	62.8	53.9	46.7
22.12.2024 – 03:00	50.8	60.8	54.0	45.2
22.12.2024 – 03:15	51.1	60.6	54.0	46.7
22.12.2024 – 03:30	49.7	58.3	52.8	43.6
22.12.2024 – 03:45	50.1	59.4	53.1	44.7
22.12.2024 – 04:00	50.0	64.3	53.1	43.1
22.12.2024 – 04:15	53.8	64.9	56.3	50.1
22.12.2024 – 04:30	51.1	63.9	53.4	47.3
22.12.2024 – 04:45	50.4	59.5	53.1	46.8
22.12.2024 – 05:00	50.7	59.6	53.2	45.9
22.12.2024 – 05:15	51.7	63.0	54.2	47.2
22.12.2024 – 05:30	53.1	73.1	55.5	49.0
22.12.2024 – 05:45	52.9	73.2	55.5	48.6
22.12.2024 – 06:00	53.5	61.3	56.4	48.2
22.12.2024 – 06:15	53.9	61.7	56.6	50.2
22.12.2024 – 06:30	53.6	61.3	56.0	49.9
22.12.2024 – 06:45	53.3	63.6	55.6	49.6
22.12.2024 – 07:00	54.1	61.4	56.8	50.4
22.12.2024 – 07:15	54.2	67.8	56.8	50.2
22.12.2024 – 07:30	55.5	70.1	58.1	50.7
22.12.2024 – 07:45	56.2	66.9	58.4	52.9
22.12.2024 – 08:00	53.6	61.2	55.8	50.6
22.12.2024 – 08:15	58.3	84.7	57.1	51.9
22.12.2024 – 08:30	55.8	62.9	57.7	53.0
22.12.2024 – 08:45	57.2	66.4	59.3	53.8
22.12.2024 – 09:00	56.5	69.5	58.3	54.0
22.12.2024 – 09:15	56.3	66.7	58.2	53.8
22.12.2024 – 09:30	56.8	67.1	58.4	54.5
22.12.2024 – 09:45	58.7	66.6	60.3	56.6

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
22.12.2024 – 10:00	58.5	74.6	59.9	56.3
22.12.2024 – 10:15	57.6	64.7	59.1	55.8
22.12.2024 – 10:30	58.4	63.8	59.8	56.5
22.12.2024 – 10:45	59.1	67.4	60.9	57.1
22.12.2024 – 11:00	58.7	63.4	60.1	56.8
22.12.2024 – 11:15	59.2	72.3	60.8	57.4
22.12.2024 – 11:30	59.3	64.6	60.8	57.5
22.12.2024 – 11:45	59.7	69.1	61.4	57.4
22.12.2024 – 12:00	60.8	75.7	62.7	58.1
22.12.2024 – 12:15	59.8	69.2	61.4	57.5
22.12.2024 – 12:30	59.2	73.0	60.9	57.1
22.12.2024 – 12:45	57.3	65.0	59.3	54.8
22.12.2024 – 13:00	58.2	70.3	60.1	55.9
22.12.2024 – 13:15	60.9	70.0	62.8	58.1
22.12.2024 – 13:30	61.5	69.9	63.3	58.9
22.12.2024 – 13:45	60.5	71.4	62.4	58.1
22.12.2024 – 14:00	59.7	68.1	61.5	57.4
22.12.2024 – 14:15	58.6	68.0	60.6	56.1
22.12.2024 – 14:30	60.1	80.5	61.9	56.7
22.12.2024 – 14:45	57.6	64.8	59.1	55.9
22.12.2024 – 15:00	57.2	64.8	58.5	55.6
22.12.2024 – 15:15	57.4	65.0	59.3	55.1
22.12.2024 – 15:30	58.1	68.3	60.1	55.3
22.12.2024 – 15:45	58.8	69.5	61.0	55.2
22.12.2024 – 16:00	58.1	67.7	60.0	54.9
22.12.2024 – 16:15	59.0	67.3	61.1	56.3
22.12.2024 – 16:30	58.3	68.2	59.8	56.6
22.12.2024 – 16:45	60.0	80.1	62.1	57.0
22.12.2024 – 17:00	57.9	73.3	59.6	55.6
22.12.2024 – 17:15	58.2	67.9	60.2	55.8
22.12.2024 – 17:30	57.6	74.1	59.8	54.2
22.12.2024 – 17:45	56.5	67.3	58.8	53.8
22.12.2024 – 18:00	56.9	77.1	58.8	54.0
22.12.2024 – 18:15	56.5	70.1	58.4	53.4
22.12.2024 – 18:30	56.4	67.2	58.6	53.4
22.12.2024 – 18:45	55.8	66.8	58.0	52.4
22.12.2024 – 19:00	55.1	66.8	56.8	53.1
22.12.2024 – 19:15	55.4	66.3	56.9	53.2
22.12.2024 – 19:30	54.2	64.3	55.9	51.8
22.12.2024 – 19:45	52.9	68.0	54.6	50.6
22.12.2024 – 20:00	53.6	62.1	55.3	51.0
22.12.2024 – 20:15	52.8	58.5	54.8	50.2
22.12.2024 – 20:30	51.4	60.8	53.2	48.9
22.12.2024 – 20:45	51.7	61.7	53.7	49.1
22.12.2024 – 21:00	50.2	64.1	52.0	47.6
22.12.2024 – 21:15	49.7	57.5	51.7	47.0
22.12.2024 – 21:30	53.1	67.8	55.2	49.3

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
22.12.2024 – 21:45	53.0	66.0	55.4	49.3
22.12.2024 – 22:00	51.1	66.0	53.1	47.9
22.12.2024 – 22:15	51.0	62.6	53.3	48.1
22.12.2024 – 22:30	52.3	67.1	54.8	48.2
22.12.2024 – 22:45	49.3	64.4	51.6	45.6
22.12.2024 – 23:00	49.1	62.2	52.0	45.1
22.12.2024 – 23:15	51.3	66.5	54.4	46.3
22.12.2024 – 23:30	49.2	67.9	51.4	45.4
22.12.2024 – 23:45	49.5	65.3	51.7	45.6
23.12.2024 – 00:00	50.3	65.5	52.8	46.7
23.12.2024 – 00:15	48.2	62.0	50.9	44.7
23.12.2024 – 00:30	47.2	59.2	49.8	43.3
23.12.2024 – 00:45	47.5	65.6	50.8	42.9
23.12.2024 – 01:00	46.3	63.3	49.1	42.1
23.12.2024 – 01:15	43.6	56.8	45.5	40.1
23.12.2024 – 01:30	44.5	57.5	46.6	39.9
23.12.2024 – 01:45	46.6	56.8	49.0	42.9
23.12.2024 – 02:00	46.8	58.5	49.1	43.5
23.12.2024 – 02:15	46.7	62.3	49.1	43.4
23.12.2024 – 02:30	47.4	59.7	49.7	44.3
23.12.2024 – 02:45	46.6	57.1	49.1	42.7
23.12.2024 – 03:00	45.1	60.8	47.3	41.3
23.12.2024 – 03:15	46.6	57.3	49.3	42.9
23.12.2024 – 03:30	46.4	56.2	48.4	43.3
23.12.2024 – 03:45	47.0	63.5	49.5	43.4
23.12.2024 – 04:00	47.2	59.9	49.9	43.2
23.12.2024 – 04:15	46.6	57.8	48.7	42.5
23.12.2024 – 04:30	47.3	59.4	49.6	42.8
23.12.2024 – 04:45	49.3	62.7	51.9	44.3
23.12.2024 – 05:00	49.0	58.8	52.3	44.5
23.12.2024 – 05:15	49.5	64.2	52.5	45.4
23.12.2024 – 05:30	50.8	59.8	53.3	47.1
23.12.2024 – 05:45	51.1	59.7	53.6	47.6
23.12.2024 – 06:00	51.0	60.0	53.3	47.6
23.12.2024 – 06:15	52.0	60.0	54.2	49.1
23.12.2024 – 06:30	52.8	66.1	54.9	49.5
23.12.2024 – 06:45	52.6	63.9	54.5	50.1
23.12.2024 – 07:00	53.4	75.1	54.2	49.5
23.12.2024 – 07:15	53.1	59.1	55.0	50.9
23.12.2024 – 07:30	53.1	60.4	54.5	51.2
23.12.2024 – 07:45	53.9	64.6	55.3	52.2
23.12.2024 – 08:00	53.9	61.7	55.5	51.9
23.12.2024 – 08:15	53.7	65.3	55.2	51.7
23.12.2024 – 08:30	54.4	61.5	55.9	52.3
23.12.2024 – 08:45	54.5	62.0	56.2	52.5
23.12.2024 – 09:00	54.7	62.7	55.9	52.9
23.12.2024 – 09:15	54.7	65.5	56.2	52.9

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
23.12.2024 – 09:30	55.5	68.5	57.1	53.4
23.12.2024 – 09:45	56.2	68.5	57.6	54.3
23.12.2024 – 10:00	58.0	74.4	57.7	54.1
23.12.2024 – 10:15	56.9	76.0	57.4	53.7

Source: Mott MacDonald

Table 12-8 Unattended noise measurement data at LT-2 location

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
13.11.2024 – 11:30	64.2	77.7	66.4	60.7
13.11.2024 – 11:45	64.2	71.3	66.2	61.1
13.11.2024 – 12:00	64.2	74.3	66.5	60.8
13.11.2024 – 12:15	64.3	78.7	66.4	60.7
13.11.2024 – 12:30	64.7	70.7	66.7	61.7
13.11.2024 – 12:45	64.4	70.9	66.4	61.4
13.11.2024 – 13:00	64.3	71.5	66.4	60.5
13.11.2024 – 13:15	65.2	72.2	67.1	61.9
13.11.2024 – 13:30	64.9	75.0	67.0	61.6
13.11.2024 – 13:45	64.7	76.8	66.8	60.5
13.11.2024 – 14:00	64.4	71.4	66.4	61.3
13.11.2024 – 14:15	64.6	89.4	66.6	61.1
13.11.2024 – 14:30	64.5	73.7	66.4	61.5
13.11.2024 – 14:45	64.3	71.6	66.3	61.2
13.11.2024 – 15:00	64.4	75.6	66.5	60.9
13.11.2024 – 15:15	64.3	71.0	66.2	61.5
13.11.2024 – 15:30	64.7	71.9	66.5	61.9
13.11.2024 – 15:45	64.6	73.1	66.6	61.4
13.11.2024 – 16:00	64.4	77.0	66.1	61.6
13.11.2024 – 16:15	64.0	72.1	65.8	61.2
13.11.2024 – 16:30	64.3	69.5	65.9	61.8
13.11.2024 – 16:45	63.8	69.7	65.3	61.4
13.11.2024 – 17:00	64.5	69.1	66.0	62.2
13.11.2024 – 17:15	64.2	72.0	66.0	61.2
13.11.2024 – 17:30	64.8	71.1	66.4	62.4
13.11.2024 – 17:45	64.3	72.5	65.8	62.2
13.11.2024 – 18:00	63.9	68.7	65.7	61.4
13.11.2024 – 18:15	64.4	79.5	65.9	61.4
13.11.2024 – 18:30	63.2	70.2	65.0	60.5
13.11.2024 – 18:45	62.5	69.9	64.7	59.0
13.11.2024 – 19:00	62.3	70.2	64.3	59.2
13.11.2024 – 19:15	61.8	69.5	64.2	57.3
13.11.2024 – 19:30	61.7	69.0	64.4	56.5
13.11.2024 – 19:45	61.8	69.9	64.5	56.9
13.11.2024 – 20:00	62.0	70.2	64.9	56.9
13.11.2024 – 20:15	60.9	76.2	63.2	55.0
13.11.2024 – 20:30	59.5	72.4	62.3	52.9
13.11.2024 – 20:45	60.3	69.0	63.6	53.8
13.11.2024 – 21:00	59.5	68.5	62.3	52.7
13.11.2024 – 21:15	59.1	67.9	62.3	52.0
13.11.2024 – 21:30	58.8	71.0	61.9	51.5
13.11.2024 – 21:45	57.9	68.4	61.0	51.5
13.11.2024 – 22:00	58.7	67.5	61.9	51.3
13.11.2024 – 22:15	58.0	70.1	60.8	50.9
13.11.2024 – 22:30	56.8	72.4	59.1	46.9

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
13.11.2024 – 22:45	56.5	67.2	59.5	46.9
13.11.2024 – 23:00	56.0	67.2	59.1	46.8
13.11.2024 – 23:15	55.0	67.1	58.5	43.6
13.11.2024 – 23:30	55.4	68.4	59.1	43.6
13.11.2024 – 23:45	54.1	68.2	58.0	42.1
14.11.2024 – 00:00	55.9	67.7	59.8	45.0
14.11.2024 – 00:15	53.1	68.5	57.0	37.6
14.11.2024 – 00:30	53.7	67.0	58.3	38.5
14.11.2024 – 00:45	54.4	69.3	58.0	36.0
14.11.2024 – 01:00	52.9	68.4	56.4	37.1
14.11.2024 – 01:15	54.1	69.0	57.8	39.1
14.11.2024 – 01:30	52.3	68.1	56.6	35.0
14.11.2024 – 01:45	54.2	70.2	58.3	35.3
14.11.2024 – 02:00	57.1	74.7	61.9	42.2
14.11.2024 – 02:15	54.1	67.7	58.2	38.8
14.11.2024 – 02:30	54.1	67.7	58.2	37.0
14.11.2024 – 02:45	55.1	71.0	58.7	37.8
14.11.2024 – 03:00	53.7	67.6	57.9	34.4
14.11.2024 – 03:15	54.8	69.0	58.6	39.1
14.11.2024 – 03:30	55.2	68.2	58.9	39.4
14.11.2024 – 03:45	56.7	69.4	60.3	44.2
14.11.2024 – 04:00	56.0	67.8	60.0	41.4
14.11.2024 – 04:15	57.4	67.2	61.3	45.3
14.11.2024 – 04:30	58.9	69.8	62.7	47.3
14.11.2024 – 04:45	58.7	70.6	61.9	48.0
14.11.2024 – 05:00	60.4	70.7	63.6	50.9
14.11.2024 – 05:15	61.8	70.2	64.7	55.9
14.11.2024 – 05:30	62.8	70.5	65.4	58.5
14.11.2024 – 05:45	62.7	71.6	65.4	57.7
14.11.2024 – 06:00	63.7	70.0	66.1	59.6
14.11.2024 – 06:15	64.2	70.5	66.5	60.0
14.11.2024 – 06:30	64.9	70.5	66.9	62.0
14.11.2024 – 06:45	65.8	72.1	67.6	62.7
14.11.2024 – 07:00	65.7	73.2	67.3	63.4
14.11.2024 – 07:15	66.1	70.0	67.4	64.4
14.11.2024 – 07:30	65.7	72.2	67.1	63.9
14.11.2024 – 07:45	66.0	71.3	67.3	64.2
14.11.2024 – 08:00	66.0	70.7	67.5	64.0
14.11.2024 – 08:15	65.9	70.8	67.5	63.8
14.11.2024 – 08:30	66.0	78.1	67.4	63.5
14.11.2024 – 08:45	65.3	70.6	67.1	62.9
14.11.2024 – 09:00	64.8	72.3	66.9	61.7
14.11.2024 – 09:15	64.7	72.6	66.7	61.3
14.11.2024 – 09:30	64.6	79.3	66.5	60.9
14.11.2024 – 09:45	65.0	82.0	67.2	61.6
14.11.2024 – 10:00	65.7	70.9	67.5	63.0
14.11.2024 – 10:15	65.9	70.9	67.9	63.2

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
14.11.2024 – 10:30	65.6	72.3	67.6	62.6
14.11.2024 – 10:45	65.7	72.0	67.7	63.0
14.11.2024 – 11:00	65.5	73.6	67.5	62.8
14.11.2024 – 11:15	65.9	72.3	68.0	62.9
14.11.2024 – 11:30	65.5	76.5	67.5	62.2
14.11.2024 – 11:45	65.3	71.8	67.4	62.1
14.11.2024 – 12:00	65.3	69.9	67.4	62.2
14.11.2024 – 12:15	65.7	72.1	67.7	62.5
14.11.2024 – 12:30	65.7	75.5	67.6	63.1
14.11.2024 – 12:45	65.3	76.6	67.3	62.7
14.11.2024 – 13:00	65.3	74.8	67.3	62.2
14.11.2024 – 13:15	65.1	70.4	67.0	62.1
14.11.2024 – 13:30	65.6	71.8	67.7	62.5
14.11.2024 – 13:45	65.1	72.5	67.2	61.9
14.11.2024 – 14:00	65.2	72.1	67.1	62.6
14.11.2024 – 14:15	64.9	71.0	66.8	61.8
14.11.2024 – 14:30	65.4	74.1	67.3	62.7
14.11.2024 – 14:45	65.4	71.2	67.4	62.6
14.11.2024 – 15:00	64.9	70.9	67.2	61.9
14.11.2024 – 15:15	65.6	74.7	67.5	62.9
14.11.2024 – 15:30	65.5	74.3	67.3	63.1
14.11.2024 – 15:45	65.7	81.1	67.4	62.7
14.11.2024 – 16:00	64.9	72.5	66.8	61.4
14.11.2024 – 16:15	65.0	71.0	66.7	62.3
14.11.2024 – 16:30	65.4	70.8	67.0	62.9
14.11.2024 – 16:45	65.2	71.0	66.8	62.9
14.11.2024 – 17:00	65.3	70.6	66.8	63.2
14.11.2024 – 17:15	65.0	69.9	66.5	62.6
14.11.2024 – 17:30	65.3	75.6	67.0	62.5
14.11.2024 – 17:45	64.8	69.5	66.6	61.8
14.11.2024 – 18:00	64.8	71.0	66.6	62.1
14.11.2024 – 18:15	64.4	69.6	66.2	61.3
14.11.2024 – 18:30	64.2	70.0	66.1	61.6
14.11.2024 – 18:45	63.3	69.4	65.4	59.8
14.11.2024 – 19:00	63.0	70.4	65.0	59.4
14.11.2024 – 19:15	62.7	69.5	64.8	59.5
14.11.2024 – 19:30	62.3	71.1	64.7	58.1
14.11.2024 – 19:45	63.5	71.1	65.5	60.2
14.11.2024 – 20:00	63.9	70.4	66.4	58.5
14.11.2024 – 20:15	63.4	71.5	66.2	57.8
14.11.2024 – 20:30	62.8	73.4	65.5	56.7
14.11.2024 – 20:45	61.0	70.9	63.7	55.7
14.11.2024 – 21:00	60.2	68.1	62.9	55.5
14.11.2024 – 21:15	59.8	69.6	62.4	54.2
14.11.2024 – 21:30	59.6	70.8	62.5	53.2
14.11.2024 – 21:45	59.3	69.5	62.2	52.7
14.11.2024 – 22:00	59.0	68.0	62.1	52.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
14.11.2024 – 22:15	59.5	72.1	62.3	52.7
14.11.2024 – 22:30	57.7	67.5	60.8	49.6
14.11.2024 – 22:45	57.4	67.8	60.8	50.1
14.11.2024 – 23:00	57.6	69.3	61.0	47.9
14.11.2024 – 23:15	56.7	69.0	60.2	45.7
14.11.2024 – 23:30	55.9	68.1	59.8	45.8
14.11.2024 – 23:45	54.9	67.7	59.0	37.8
15.11.2024 – 00:00	55.3	69.0	58.9	39.3
15.11.2024 – 00:15	54.5	67.5	58.3	39.6
15.11.2024 – 00:30	53.8	68.5	57.0	35.3
15.11.2024 – 00:45	52.1	68.4	56.1	34.0
15.11.2024 – 01:00	53.0	67.3	57.0	33.7
15.11.2024 – 01:15	54.1	68.7	58.5	32.1
15.11.2024 – 01:30	55.3	68.1	59.8	34.3
15.11.2024 – 01:45	56.0	69.5	59.8	38.9
15.11.2024 – 02:00	55.2	69.8	59.2	35.4
15.11.2024 – 02:15	56.2	69.5	60.4	33.3
15.11.2024 – 02:30	55.8	68.0	60.1	38.4
15.11.2024 – 02:45	55.0	68.7	58.8	29.7
15.11.2024 – 03:00	55.2	69.3	59.1	34.1
15.11.2024 – 03:15	55.1	69.7	58.8	34.5
15.11.2024 – 03:30	54.8	68.1	59.2	30.9
15.11.2024 – 03:45	55.4	68.5	59.5	38.5
15.11.2024 – 04:00	56.3	68.9	60.2	38.8
15.11.2024 – 04:15	58.6	68.8	62.5	45.3
15.11.2024 – 04:30	58.3	69.0	62.3	42.8
15.11.2024 – 04:45	59.3	73.1	63.1	47.7
15.11.2024 – 05:00	59.0	69.3	62.4	50.2
15.11.2024 – 05:15	61.7	71.0	64.7	54.9
15.11.2024 – 05:30	63.0	70.2	65.9	57.2
15.11.2024 – 05:45	63.0	70.0	66.0	57.6
15.11.2024 – 06:00	63.6	70.8	66.0	59.9
15.11.2024 – 06:15	64.2	71.1	66.5	60.3
15.11.2024 – 06:30	64.9	71.7	66.9	61.7
15.11.2024 – 06:45	66.0	71.2	67.7	63.2
15.11.2024 – 07:00	66.7	71.6	68.5	64.1
15.11.2024 – 07:15	66.3	71.6	67.8	64.1
15.11.2024 – 07:30	66.6	71.6	68.1	64.8
15.11.2024 – 07:45	65.7	73.7	67.7	63.6
15.11.2024 – 08:00	66.3	70.8	67.8	64.0
15.11.2024 – 08:15	66.3	73.4	67.9	63.9
15.11.2024 – 08:30	66.4	72.3	68.0	64.0
15.11.2024 – 08:45	66.2	72.5	68.2	63.6
15.11.2024 – 09:00	65.7	73.2	67.9	62.2
15.11.2024 – 09:15	65.3	71.7	67.5	62.2
15.11.2024 – 09:30	69.4	88.2	68.1	62.1
15.11.2024 – 09:45	65.5	71.2	67.6	62.8

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
15.11.2024 – 10:00	65.9	77.6	67.5	63.1
15.11.2024 – 10:15	65.7	71.4	67.6	62.9
15.11.2024 – 10:30	65.9	71.4	67.4	63.5
15.11.2024 – 10:45	65.8	70.6	67.8	62.9
15.11.2024 – 11:00	65.7	72.2	67.4	63.2
15.11.2024 – 11:15	65.6	72.1	67.4	63.1
15.11.2024 – 11:30	65.8	77.3	67.6	63.1
15.11.2024 – 11:45	65.2	72.8	67.0	62.6
15.11.2024 – 12:00	65.1	71.2	66.8	62.7
15.11.2024 – 12:15	64.7	69.6	66.8	61.4
15.11.2024 – 12:30	65.4	71.9	67.2	62.4
15.11.2024 – 12:45	65.0	70.9	67.0	62.0
15.11.2024 – 13:00	64.9	70.5	67.1	61.6
15.11.2024 – 13:15	65.6	71.4	67.4	63.0
15.11.2024 – 13:30	65.5	77.0	67.1	63.1
15.11.2024 – 13:45	65.2	72.8	67.0	62.5
15.11.2024 – 14:00	65.1	72.2	66.9	62.4
15.11.2024 – 14:15	64.4	71.4	66.3	61.2
15.11.2024 – 14:30	64.9	71.7	66.7	62.3
15.11.2024 – 14:45	64.3	71.2	66.2	61.6
15.11.2024 – 15:00	64.2	70.3	66.2	61.1
15.11.2024 – 15:15	63.6	69.8	65.6	60.1
15.11.2024 – 15:30	64.2	75.1	65.9	61.4
15.11.2024 – 15:45	65.2	74.5	66.6	63.0
15.11.2024 – 16:00	64.9	70.5	66.5	62.5
15.11.2024 – 16:15	64.8	75.6	66.3	62.2
15.11.2024 – 16:30	64.0	70.7	65.6	61.5
15.11.2024 – 16:45	63.9	70.3	65.7	61.4
15.11.2024 – 17:00	64.3	78.1	65.8	61.0
15.11.2024 – 17:15	64.2	70.6	66.0	61.2
15.11.2024 – 17:30	64.1	74.8	65.8	61.3
15.11.2024 – 17:45	64.0	70.5	65.8	61.5
15.11.2024 – 18:00	64.0	68.6	65.7	61.6
15.11.2024 – 18:15	64.2	70.5	65.9	61.9
15.11.2024 – 18:30	63.3	68.3	65.0	61.0
15.11.2024 – 18:45	63.2	70.7	65.1	60.3
15.11.2024 – 19:00	62.8	69.7	64.7	60.2
15.11.2024 – 19:15	62.5	69.6	64.6	59.0
15.11.2024 – 19:30	62.3	70.4	64.3	58.9
15.11.2024 – 19:45	61.9	71.3	63.9	58.0
15.11.2024 – 20:00	61.9	69.6	64.4	57.9
15.11.2024 – 20:15	61.4	70.4	63.7	57.0
15.11.2024 – 20:30	61.4	74.0	63.9	56.4
15.11.2024 – 20:45	59.8	68.8	62.7	54.6
15.11.2024 – 21:00	59.8	68.9	62.5	54.2
15.11.2024 – 21:15	59.0	68.0	61.7	53.9
15.11.2024 – 21:30	59.8	72.3	62.4	53.8

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
15.11.2024 – 21:45	58.3	71.2	61.2	52.3
15.11.2024 – 22:00	58.0	68.0	61.0	51.4
15.11.2024 – 22:15	58.8	70.2	61.6	52.5
15.11.2024 – 22:30	57.7	67.3	60.4	52.3
15.11.2024 – 22:45	57.0	66.4	59.9	50.2
15.11.2024 – 23:00	57.9	68.9	60.8	49.8
15.11.2024 – 23:15	56.3	67.0	59.9	49.0
15.11.2024 – 23:30	56.8	68.3	60.1	48.8
15.11.2024 – 23:45	56.5	67.4	59.8	49.5
16.11.2024 – 00:00	57.8	76.5	60.9	47.0
16.11.2024 – 00:15	56.2	68.6	59.4	47.6
16.11.2024 – 00:30	53.3	64.5	57.5	39.7
16.11.2024 – 00:45	54.3	69.5	57.7	38.3
16.11.2024 – 01:00	53.4	69.9	57.1	36.4
16.11.2024 – 01:15	53.4	66.8	57.5	37.0
16.11.2024 – 01:30	53.6	68.7	58.2	31.9
16.11.2024 – 01:45	56.4	71.1	59.8	35.1
16.11.2024 – 02:00	57.9	75.5	62.4	40.9
16.11.2024 – 02:15	56.6	69.7	61.5	37.1
16.11.2024 – 02:30	53.6	69.4	57.4	32.1
16.11.2024 – 02:45	55.1	68.7	59.4	32.8
16.11.2024 – 03:00	54.3	68.4	57.9	34.9
16.11.2024 – 03:15	54.4	67.9	58.1	36.9
16.11.2024 – 03:30	54.5	69.2	58.1	35.2
16.11.2024 – 03:45	55.4	69.4	59.6	34.8
16.11.2024 – 04:00	53.6	67.7	58.5	31.8
16.11.2024 – 04:15	56.0	68.7	60.1	35.7
16.11.2024 – 04:30	56.2	71.9	59.9	41.9
16.11.2024 – 04:45	54.2	64.6	58.6	42.2
16.11.2024 – 05:00	56.1	69.6	59.9	41.6
16.11.2024 – 05:15	57.5	70.6	61.4	45.6
16.11.2024 – 05:30	58.4	67.4	61.8	48.8
16.11.2024 – 05:45	58.7	68.1	61.9	51.1
16.11.2024 – 06:00	58.8	67.7	62.0	50.8
16.11.2024 – 06:15	59.8	69.3	63.3	51.1
16.11.2024 – 06:30	60.0	67.6	62.8	53.1
16.11.2024 – 06:45	60.4	71.2	63.6	53.8
16.11.2024 – 07:00	60.9	71.2	63.7	55.0
16.11.2024 – 07:15	61.3	69.7	64.3	54.7
16.11.2024 – 07:30	62.0	70.8	64.9	56.0
16.11.2024 – 07:45	62.0	70.9	64.4	57.1
16.11.2024 – 08:00	62.5	75.2	64.8	57.4
16.11.2024 – 08:15	62.8	71.1	65.1	58.9
16.11.2024 – 08:30	63.4	71.7	65.6	59.9
16.11.2024 – 08:45	63.3	69.9	65.5	59.4
16.11.2024 – 09:00	63.5	79.0	65.4	58.8
16.11.2024 – 09:15	63.6	69.8	65.6	60.2

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
16.11.2024 – 09:30	63.7	75.1	65.4	60.8
16.11.2024 – 09:45	64.6	71.8	66.6	61.4
16.11.2024 – 10:00	64.9	70.7	66.6	62.4
16.11.2024 – 10:15	65.3	73.3	67.0	63.0
16.11.2024 – 10:30	65.1	69.9	66.6	63.0
16.11.2024 – 10:45	65.2	72.2	67.0	62.9
16.11.2024 – 11:00	64.9	71.6	66.5	62.7
16.11.2024 – 11:15	65.3	71.0	66.9	63.0
16.11.2024 – 11:30	66.7	92.6	67.4	63.5
16.11.2024 – 11:45	64.9	70.2	66.2	62.9
16.11.2024 – 12:00	64.9	70.7	66.4	62.9
16.11.2024 – 12:15	64.7	72.3	66.1	62.6
16.11.2024 – 12:30	65.0	78.4	66.2	62.3
16.11.2024 – 12:45	64.6	69.9	66.2	62.4
16.11.2024 – 13:00	64.1	74.9	65.7	61.5
16.11.2024 – 13:15	64.4	72.7	66.1	61.7
16.11.2024 – 13:30	64.7	71.3	66.6	61.8
16.11.2024 – 13:45	65.2	70.4	67.1	62.9
16.11.2024 – 14:00	64.5	71.4	66.3	61.9
16.11.2024 – 14:15	64.1	69.7	65.8	61.8
16.11.2024 – 14:30	63.9	72.0	65.7	61.1
16.11.2024 – 14:45	63.9	69.6	65.6	61.3
16.11.2024 – 15:00	63.7	67.9	65.5	60.8
16.11.2024 – 15:15	64.1	72.8	65.8	61.1
16.11.2024 – 15:30	64.2	76.2	65.9	61.2
16.11.2024 – 15:45	63.4	68.3	65.2	60.5
16.11.2024 – 16:00	63.7	70.1	65.4	60.9
16.11.2024 – 16:15	63.9	69.9	65.7	61.4
16.11.2024 – 16:30	64.0	71.8	65.7	61.8
16.11.2024 – 16:45	63.5	71.4	65.3	60.5
16.11.2024 – 17:00	63.4	68.1	65.3	60.5
16.11.2024 – 17:15	63.8	69.2	65.6	61.1
16.11.2024 – 17:30	63.4	70.0	65.3	60.3
16.11.2024 – 17:45	63.1	70.3	65.1	60.2
16.11.2024 – 18:00	63.0	69.3	65.0	60.2
16.11.2024 – 18:15	62.6	73.9	64.5	59.4
16.11.2024 – 18:30	62.3	68.4	64.7	58.9
16.11.2024 – 18:45	61.3	78.6	63.5	56.9
16.11.2024 – 19:00	61.6	67.9	63.8	57.6
16.11.2024 – 19:15	61.0	70.0	63.2	57.2
16.11.2024 – 19:30	60.7	69.4	62.9	56.5
16.11.2024 – 19:45	60.6	72.0	63.1	55.7
16.11.2024 – 20:00	60.7	69.6	63.5	54.1
16.11.2024 – 20:15	60.0	69.8	62.6	54.6
16.11.2024 – 20:30	59.2	67.1	61.8	54.0
16.11.2024 – 20:45	59.4	69.4	62.1	53.7
16.11.2024 – 21:00	58.8	67.0	61.8	53.4

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
16.11.2024 – 21:15	58.9	68.8	61.7	52.9
16.11.2024 – 21:30	58.2	70.7	61.1	52.2
16.11.2024 – 21:45	58.9	69.5	61.7	52.9
16.11.2024 – 22:00	59.6	76.3	62.5	51.7
16.11.2024 – 22:15	58.5	68.6	61.7	50.9
16.11.2024 – 22:30	58.0	66.6	61.3	50.8
16.11.2024 – 22:45	56.9	68.1	60.2	48.8
16.11.2024 – 23:00	56.6	67.2	60.1	49.4
16.11.2024 – 23:15	56.6	66.5	59.6	48.5
16.11.2024 – 23:30	56.0	64.8	59.5	48.0
16.11.2024 – 23:45	56.4	67.5	59.7	48.1
17.11.2024 – 00:00	56.1	67.5	59.5	47.4
17.11.2024 – 00:15	54.9	67.0	58.8	45.9
17.11.2024 – 00:30	54.1	63.1	58.1	43.6
17.11.2024 – 00:45	53.4	62.1	57.9	43.7
17.11.2024 – 01:00	53.5	69.2	57.3	38.9
17.11.2024 – 01:15	53.0	66.6	57.2	41.8
17.11.2024 – 01:30	52.9	67.6	57.2	40.0
17.11.2024 – 01:45	54.7	70.5	58.0	41.0
17.11.2024 – 02:00	55.3	69.9	58.8	39.8
17.11.2024 – 02:15	52.4	68.2	56.7	39.5
17.11.2024 – 02:30	52.9	67.6	56.9	36.4
17.11.2024 – 02:45	54.7	68.8	58.2	38.8
17.11.2024 – 03:00	53.9	68.7	57.6	38.8
17.11.2024 – 03:15	51.4	66.1	56.2	36.6
17.11.2024 – 03:30	53.4	68.0	57.6	39.6
17.11.2024 – 03:45	52.9	68.2	57.7	33.7
17.11.2024 – 04:00	52.9	69.0	57.9	33.6
17.11.2024 – 04:15	52.5	67.1	57.1	34.6
17.11.2024 – 04:30	54.3	69.5	58.5	40.9
17.11.2024 – 04:45	54.4	66.4	58.5	43.4
17.11.2024 – 05:00	56.1	69.1	59.7	44.2
17.11.2024 – 05:15	56.7	69.1	60.7	43.9
17.11.2024 – 05:30	58.1	69.4	61.4	46.4
17.11.2024 – 05:45	58.2	67.7	61.6	48.2
17.11.2024 – 06:00	58.3	68.6	61.8	46.6
17.11.2024 – 06:15	59.0	69.0	62.3	51.1
17.11.2024 – 06:30	59.2	67.1	62.5	52.5
17.11.2024 – 06:45	59.7	68.3	63.0	52.9
17.11.2024 – 07:00	60.7	69.1	63.5	55.5
17.11.2024 – 07:15	60.2	74.2	62.7	55.1
17.11.2024 – 07:30	60.6	69.7	63.1	56.0
17.11.2024 – 07:45	60.9	67.3	63.5	56.4
17.11.2024 – 08:00	60.1	72.5	62.5	55.2
17.11.2024 – 08:15	61.2	69.5	64.0	55.9
17.11.2024 – 08:30	62.0	74.0	64.4	57.4
17.11.2024 – 08:45	61.7	69.4	64.1	57.5

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
17.11.2024 – 09:00	62.4	69.5	64.6	58.8
17.11.2024 – 09:15	63.0	70.4	65.1	59.5
17.11.2024 – 09:30	63.3	69.8	65.5	59.8
17.11.2024 – 09:45	64.0	69.9	65.9	61.1
17.11.2024 – 10:00	64.1	69.6	66.0	61.1
17.11.2024 – 10:15	64.2	72.0	66.0	61.4
17.11.2024 – 10:30	64.8	69.0	66.5	62.0
17.11.2024 – 10:45	65.0	71.4	66.5	62.9
17.11.2024 – 11:00	65.2	72.2	66.6	62.9
17.11.2024 – 11:15	65.3	70.6	66.6	63.1
17.11.2024 – 11:30	65.5	70.1	66.9	63.9
17.11.2024 – 11:45	65.1	69.7	66.5	63.2
17.11.2024 – 12:00	65.4	69.9	66.9	63.3
17.11.2024 – 12:15	65.5	75.2	67.0	63.1
17.11.2024 – 12:30	65.5	75.7	66.8	63.6
17.11.2024 – 12:45	65.4	70.2	66.8	63.5
17.11.2024 – 13:00	65.1	70.0	66.6	62.8
17.11.2024 – 13:15	64.8	82.1	66.4	62.1
17.11.2024 – 13:30	64.5	71.0	66.2	61.9
17.11.2024 – 13:45	64.3	70.2	66.0	62.0
17.11.2024 – 14:00	64.9	77.9	66.3	62.7
17.11.2024 – 14:15	65.2	70.5	66.8	63.0
17.11.2024 – 14:30	65.2	72.7	66.4	63.6
17.11.2024 – 14:45	65.2	71.1	66.5	63.4
17.11.2024 – 15:00	64.8	69.8	66.2	62.5
17.11.2024 – 15:15	65.0	73.1	66.4	63.1
17.11.2024 – 15:30	64.9	69.3	66.2	63.0
17.11.2024 – 15:45	64.3	70.2	66.0	61.8
17.11.2024 – 16:00	65.0	72.3	66.3	63.0
17.11.2024 – 16:15	64.6	70.3	66.3	61.7
17.11.2024 – 16:30	64.5	70.2	66.2	62.0
17.11.2024 – 16:45	64.1	68.6	65.9	61.3
17.11.2024 – 17:00	63.8	70.1	65.5	61.3
17.11.2024 – 17:15	63.8	73.0	65.8	60.3
17.11.2024 – 17:30	64.5	81.6	66.1	60.9
17.11.2024 – 17:45	63.8	69.4	65.8	61.0
17.11.2024 – 18:00	63.7	69.3	65.6	60.7
17.11.2024 – 18:15	63.0	68.9	65.2	59.5
17.11.2024 – 18:30	62.7	70.0	65.1	58.3
17.11.2024 – 18:45	62.7	68.9	64.9	59.2
17.11.2024 – 19:00	62.1	68.3	64.5	58.1
17.11.2024 – 19:15	62.5	69.4	64.7	58.2
17.11.2024 – 19:30	63.6	72.7	66.2	58.9
17.11.2024 – 19:45	62.7	70.4	65.6	57.0
17.11.2024 – 20:00	61.8	70.2	64.5	56.1
17.11.2024 – 20:15	60.8	71.1	63.8	54.2
17.11.2024 – 20:30	61.2	69.5	63.6	56.6

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
17.11.2024 – 20:45	60.9	69.3	63.6	55.7
17.11.2024 – 21:00	59.5	70.0	62.4	52.4
17.11.2024 – 21:15	58.7	71.4	61.3	50.5
17.11.2024 – 21:30	58.9	67.7	62.1	50.3
17.11.2024 – 21:45	58.1	70.0	61.3	49.9
17.11.2024 – 22:00	57.6	70.3	60.3	49.8
17.11.2024 – 22:15	56.0	67.9	59.7	45.4
17.11.2024 – 22:30	56.5	68.5	60.3	46.0
17.11.2024 – 22:45	57.2	68.7	60.7	46.5
17.11.2024 – 23:00	56.9	73.8	60.1	47.0
17.11.2024 – 23:15	55.1	66.5	59.1	41.6
17.11.2024 – 23:30	54.3	66.5	58.3	38.8
17.11.2024 – 23:45	55.0	70.5	58.5	38.2
18.11.2024 – 00:00	54.3	67.8	58.7	38.5
18.11.2024 – 00:15	54.9	67.7	59.6	40.3
18.11.2024 – 00:30	54.7	70.3	58.0	42.6
18.11.2024 – 00:45	53.3	68.4	56.9	37.9
18.11.2024 – 01:00	52.7	68.5	57.1	34.1
18.11.2024 – 01:15	54.5	68.4	58.2	42.3
18.11.2024 – 01:30	56.2	69.4	59.5	40.0
18.11.2024 – 01:45	54.4	68.7	58.6	39.5
18.11.2024 – 02:00	56.3	69.9	59.5	37.6
18.11.2024 – 02:15	54.7	68.7	59.0	38.3
18.11.2024 – 02:30	54.0	70.1	57.5	37.0
18.11.2024 – 02:45	54.0	68.5	58.5	33.2
18.11.2024 – 03:00	54.4	68.5	59.3	35.4
18.11.2024 – 03:15	56.1	73.4	59.4	36.1
18.11.2024 – 03:30	55.6	67.4	59.9	36.4
18.11.2024 – 03:45	57.4	74.0	61.1	44.4
18.11.2024 – 04:00	55.7	67.8	59.8	39.9
18.11.2024 – 04:15	58.7	70.0	62.0	49.4
18.11.2024 – 04:30	59.0	68.9	62.6	49.8
18.11.2024 – 04:45	59.4	69.0	62.8	50.8
18.11.2024 – 05:00	61.5	69.6	65.0	52.7
18.11.2024 – 05:15	62.7	70.3	66.0	56.1
18.11.2024 – 05:30	64.5	71.0	67.1	59.4
18.11.2024 – 05:45	64.0	71.5	66.5	59.9
18.11.2024 – 06:00	64.3	72.3	66.9	59.5
18.11.2024 – 06:15	64.8	70.0	67.0	61.2
18.11.2024 – 06:30	65.9	71.0	67.6	63.5
18.11.2024 – 06:45	66.6	73.4	68.1	64.1
18.11.2024 – 07:00	67.0	71.3	68.5	65.0
18.11.2024 – 07:15	67.2	74.6	68.5	65.3
18.11.2024 – 07:30	66.0	71.4	67.5	63.5
18.11.2024 – 07:45	66.3	72.3	67.9	63.9
18.11.2024 – 08:00	67.0	80.4	68.0	65.1
18.11.2024 – 08:15	66.7	70.6	67.9	65.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
18.11.2024 – 08:30	66.7	73.1	68.0	64.6
18.11.2024 – 08:45	66.6	71.2	68.0	64.7
18.11.2024 – 09:00	66.4	75.5	68.1	64.1
18.11.2024 – 09:15	65.0	71.9	66.8	62.3
18.11.2024 – 09:30	65.2	71.9	67.4	62.0
18.11.2024 – 09:45	65.3	72.6	67.4	62.1
18.11.2024 – 10:00	65.3	71.0	67.4	62.2
18.11.2024 – 10:15	65.9	72.9	67.8	63.0
18.11.2024 – 10:30	66.9	77.7	68.6	64.2
18.11.2024 – 10:45	66.4	74.9	67.9	64.2
18.11.2024 – 11:00	65.8	71.7	67.6	62.9
18.11.2024 – 11:15	66.0	72.2	67.8	63.2
18.11.2024 – 11:30	65.7	75.7	67.4	63.3
18.11.2024 – 11:45	65.6	71.6	67.5	62.7
18.11.2024 – 12:00	65.6	71.5	67.5	62.9
18.11.2024 – 12:15	65.7	70.2	67.5	62.7
18.11.2024 – 12:30	65.8	72.1	67.6	63.1
18.11.2024 – 12:45	65.8	72.3	67.6	63.1
18.11.2024 – 13:00	66.6	76.9	68.5	63.2
18.11.2024 – 13:15	66.5	79.9	68.3	63.4
18.11.2024 – 13:30	66.2	71.6	68.1	63.6
18.11.2024 – 13:45	65.7	74.9	67.7	62.8
18.11.2024 – 14:00	66.2	74.0	68.1	63.5
18.11.2024 – 14:15	65.6	71.5	67.4	62.8
18.11.2024 – 14:30	65.7	72.7	67.5	63.0
18.11.2024 – 14:45	65.9	71.1	67.9	62.7
18.11.2024 – 15:00	65.7	72.1	67.5	62.8
18.11.2024 – 15:15	65.6	69.9	67.4	63.2
18.11.2024 – 15:30	66.0	75.0	67.7	63.2
18.11.2024 – 15:45	65.9	71.9	67.7	63.3
18.11.2024 – 16:00	66.2	71.4	67.8	64.0
18.11.2024 – 16:15	66.3	77.7	68.0	63.7
18.11.2024 – 16:30	66.2	71.6	67.7	64.1
18.11.2024 – 16:45	66.3	74.7	67.7	64.1
18.11.2024 – 17:00	66.4	70.8	67.9	64.2
18.11.2024 – 17:15	66.1	71.5	67.9	63.3
18.11.2024 – 17:30	66.0	74.7	67.7	63.6
18.11.2024 – 17:45	65.8	70.6	67.5	63.2
18.11.2024 – 18:00	65.6	71.1	67.5	62.9
18.11.2024 – 18:15	65.5	72.6	67.4	62.5
18.11.2024 – 18:30	64.9	72.3	66.8	62.1
18.11.2024 – 18:45	64.3	71.0	66.6	60.9
18.11.2024 – 19:00	63.7	71.1	66.1	59.7
18.11.2024 – 19:15	63.6	71.4	66.0	59.9
18.11.2024 – 19:30	63.4	70.8	65.8	58.9
18.11.2024 – 19:45	63.6	72.8	66.8	58.6
18.11.2024 – 20:00	63.3	73.0	66.0	58.2

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
18.11.2024 – 20:15	62.5	74.8	64.6	57.8
18.11.2024 – 20:30	62.4	72.3	65.7	56.8
18.11.2024 – 20:45	62.0	70.6	65.3	55.0
18.11.2024 – 21:00	61.2	69.3	64.1	54.7
18.11.2024 – 21:15	59.9	67.7	62.6	52.8
18.11.2024 – 21:30	59.6	69.9	63.3	50.0
18.11.2024 – 21:45	57.5	68.3	60.6	48.0
18.11.2024 – 22:00	57.3	67.7	60.7	48.6
18.11.2024 – 22:15	56.3	65.4	59.6	48.7
18.11.2024 – 22:30	54.7	66.6	57.8	43.9
18.11.2024 – 22:45	55.7	65.7	59.5	44.8
18.11.2024 – 23:00	57.4	66.4	61.6	45.0
18.11.2024 – 23:15	54.6	65.9	58.7	43.0
18.11.2024 – 23:30	54.3	68.7	58.1	40.1
18.11.2024 – 23:45	56.0	67.9	60.1	43.4
19.11.2024 – 00:00	56.2	69.1	59.9	45.1
19.11.2024 – 00:15	56.1	69.0	60.1	41.7
19.11.2024 – 00:30	53.5	66.6	57.9	34.6
19.11.2024 – 00:45	54.8	69.8	59.0	36.6
19.11.2024 – 01:00	54.0	68.1	57.4	34.9
19.11.2024 – 01:15	55.0	70.0	59.1	34.8
19.11.2024 – 01:30	54.1	69.6	57.6	33.4
19.11.2024 – 01:45	54.2	66.9	59.5	32.2
19.11.2024 – 02:00	57.0	70.0	61.3	32.2
19.11.2024 – 02:15	54.0	68.4	58.2	31.7
19.11.2024 – 02:30	53.3	67.6	58.1	33.4
19.11.2024 – 02:45	55.5	69.4	59.9	31.0
19.11.2024 – 03:00	59.5	70.5	65.3	33.1
19.11.2024 – 03:15	56.2	70.8	60.4	31.0
19.11.2024 – 03:30	57.5	70.9	61.4	38.2
19.11.2024 – 03:45	57.2	70.2	60.9	37.0
19.11.2024 – 04:00	55.9	69.2	60.2	36.1
19.11.2024 – 04:15	58.0	69.3	62.0	44.6
19.11.2024 – 04:30	59.0	69.7	62.8	46.4
19.11.2024 – 04:45	59.1	68.3	63.0	49.1
19.11.2024 – 05:00	60.3	68.5	64.0	50.1
19.11.2024 – 05:15	62.2	69.8	65.8	53.1
19.11.2024 – 05:30	63.4	71.3	66.1	57.9
19.11.2024 – 05:45	63.5	71.1	66.4	58.5
19.11.2024 – 06:00	63.3	72.1	66.1	58.0
19.11.2024 – 06:15	64.5	70.8	66.9	59.9
19.11.2024 – 06:30	64.8	71.7	67.0	61.1
19.11.2024 – 06:45	65.4	70.4	67.1	62.4
19.11.2024 – 07:00	65.7	71.7	67.3	62.7
19.11.2024 – 07:15	66.3	73.2	67.8	64.2
19.11.2024 – 07:30	65.4	70.3	66.9	62.9
19.11.2024 – 07:45	65.8	73.2	67.2	63.8

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
19.11.2024 – 08:00	65.6	70.0	67.3	63.1
19.11.2024 – 08:15	66.0	71.4	67.6	63.6
19.11.2024 – 08:30	66.1	70.9	67.6	64.2
19.11.2024 – 08:45	66.1	71.0	67.8	63.7
19.11.2024 – 09:00	66.1	72.7	67.8	63.6
19.11.2024 – 09:15	64.6	71.3	67.0	61.1
19.11.2024 – 09:30	64.9	70.9	67.1	61.5
19.11.2024 – 09:45	65.1	75.3	67.1	61.8
19.11.2024 – 10:00	65.3	71.4	67.6	61.5
19.11.2024 – 10:15	65.6	73.5	67.7	62.3
19.11.2024 – 10:30	65.4	75.1	67.6	61.9
19.11.2024 – 10:45	64.8	72.9	67.2	60.9
19.11.2024 – 11:00	65.1	71.1	67.3	61.5
19.11.2024 – 11:15	65.4	71.3	67.8	61.7
19.11.2024 – 11:30	65.1	70.7	67.2	61.8
19.11.2024 – 11:45	64.5	71.0	66.9	60.9
19.11.2024 – 12:00	64.5	69.8	66.8	61.2
19.11.2024 – 12:15	64.8	70.5	67.1	61.3
19.11.2024 – 12:30	64.9	72.2	67.1	61.8
19.11.2024 – 12:45	65.2	70.9	67.3	61.9
19.11.2024 – 13:00	65.1	70.5	67.4	61.3
19.11.2024 – 13:15	65.7	71.9	67.7	62.4
19.11.2024 – 13:30	65.6	74.4	67.7	62.2
19.11.2024 – 13:45	65.2	73.3	67.4	61.9
19.11.2024 – 14:00	65.6	71.8	67.9	62.0
19.11.2024 – 14:15	65.1	70.5	67.3	61.9
19.11.2024 – 14:30	65.2	71.4	67.3	61.8
19.11.2024 – 14:45	65.2	75.0	67.1	62.2
19.11.2024 – 15:00	65.3	71.0	67.4	61.7
19.11.2024 – 15:15	65.1	71.3	67.3	61.9
19.11.2024 – 15:30	65.8	82.3	67.6	62.7
19.11.2024 – 15:45	65.6	71.2	67.5	62.9
19.11.2024 – 16:00	65.8	70.8	67.5	63.1
19.11.2024 – 16:15	66.0	71.5	67.7	63.4
19.11.2024 – 16:30	65.8	70.8	67.3	63.6
19.11.2024 – 16:45	65.8	71.0	67.4	63.4
19.11.2024 – 17:00	65.6	70.5	67.3	63.1
19.11.2024 – 17:15	65.5	72.0	67.1	63.0
19.11.2024 – 17:30	65.6	74.4	67.6	62.7
19.11.2024 – 17:45	71.6	93.5	67.0	62.3
19.11.2024 – 18:00	64.4	69.8	66.2	61.6
19.11.2024 – 18:15	64.2	70.6	66.1	61.2
19.11.2024 – 18:30	63.6	69.2	65.9	59.8
19.11.2024 – 18:45	62.8	70.5	65.5	58.6
19.11.2024 – 19:00	62.5	70.1	65.0	58.3
19.11.2024 – 19:15	62.1	69.9	64.5	57.5
19.11.2024 – 19:30	62.5	72.7	64.7	57.5

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
19.11.2024 – 19:45	62.9	80.1	65.7	56.4
19.11.2024 – 20:00	61.6	71.3	64.4	55.9
19.11.2024 – 20:15	61.6	74.4	64.5	55.2
19.11.2024 – 20:30	60.3	68.8	62.8	54.5
19.11.2024 – 20:45	61.8	72.3	64.9	56.0
19.11.2024 – 21:00	60.4	69.3	63.4	54.1
19.11.2024 – 21:15	59.5	69.2	62.7	51.9
19.11.2024 – 21:30	60.0	71.6	63.4	52.6
19.11.2024 – 21:45	59.3	68.6	62.1	52.3
19.11.2024 – 22:00	59.3	67.7	62.1	53.4
19.11.2024 – 22:15	57.8	67.5	60.8	51.9
19.11.2024 – 22:30	58.4	67.9	61.6	50.8
19.11.2024 – 22:45	55.9	66.5	59.9	46.1
19.11.2024 – 23:00	57.8	69.9	61.2	48.8
19.11.2024 – 23:15	55.4	66.7	59.4	44.6
19.11.2024 – 23:30	55.9	69.5	59.3	45.1
19.11.2024 – 23:45	54.2	65.8	58.3	42.7
20.11.2024 – 00:00	56.1	69.3	59.4	41.8
20.11.2024 – 00:15	54.9	69.2	59.0	39.6
20.11.2024 – 00:30	54.3	68.3	58.7	36.9
20.11.2024 – 00:45	53.8	68.5	57.7	36.0
20.11.2024 – 01:00	54.7	69.1	59.0	39.0
20.11.2024 – 01:15	54.1	66.2	58.5	40.6
20.11.2024 – 01:30	56.5	69.9	60.8	38.4
20.11.2024 – 01:45	59.6	72.1	65.0	43.2
20.11.2024 – 02:00	56.5	69.7	60.8	38.6
20.11.2024 – 02:15	55.9	69.9	60.0	36.5
20.11.2024 – 02:30	54.3	67.9	58.4	35.9
20.11.2024 – 02:45	55.9	68.6	61.0	37.4
20.11.2024 – 03:00	55.9	69.5	59.4	37.7
20.11.2024 – 03:15	56.4	69.8	59.7	36.2
20.11.2024 – 03:30	56.9	68.7	61.7	34.9
20.11.2024 – 03:45	57.1	72.5	61.4	35.9
20.11.2024 – 04:00	58.2	78.0	62.3	42.0
20.11.2024 – 04:15	58.3	69.1	61.7	47.4
20.11.2024 – 04:30	58.2	67.5	61.7	47.4
20.11.2024 – 04:45	59.5	70.2	62.7	49.3
20.11.2024 – 05:00	59.8	68.8	63.3	51.0
20.11.2024 – 05:15	61.8	69.7	64.8	55.6
20.11.2024 – 05:30	64.1	71.3	66.7	59.7
20.11.2024 – 05:45	63.9	71.0	66.5	58.5
20.11.2024 – 06:00	64.4	72.7	67.2	59.4
20.11.2024 – 06:15	64.8	70.8	66.9	61.1
20.11.2024 – 06:30	66.0	70.7	67.7	63.0
20.11.2024 – 06:45	66.4	71.6	68.2	63.6
20.11.2024 – 07:00	66.5	73.9	68.2	64.3
20.11.2024 – 07:15	66.9	71.0	68.3	65.1

Date and Time	$L_{Aeq,1hour}$ (dB)	$L_{AFmax,1hour}$ (dB)	$L_{A10,1hour}$ (dB)	$L_{A90,1hour}$ (dB)
20.11.2024 – 07:30	66.7	72.5	67.9	65.2
20.11.2024 – 07:45	66.8	70.8	68.0	65.1
20.11.2024 – 08:00	67.0	71.4	68.3	65.3
20.11.2024 – 08:15	67.0	71.0	68.3	65.4
20.11.2024 – 08:30	66.6	71.1	68.2	64.5
20.11.2024 – 08:45	66.2	70.3	67.8	64.0
20.11.2024 – 09:00	66.8	72.4	68.2	64.7
20.11.2024 – 09:15	66.5	71.2	68.3	63.6
20.11.2024 – 09:30	66.4	74.8	68.2	63.9
20.11.2024 – 09:45	65.3	71.5	67.2	62.6
20.11.2024 – 10:00	65.4	78.1	67.3	62.3
20.11.2024 – 10:15	65.0	71.5	67.3	61.9
20.11.2024 – 10:30	65.2	70.8	67.4	62.1
20.11.2024 – 10:45	64.9	71.4	66.9	61.8
20.11.2024 – 11:00	65.2	70.4	67.3	62.2
20.11.2024 – 11:15	65.2	72.3	67.3	61.9

Source: Mott MacDonald

12.9 Meteorological Data

Table 12-9 Meteorological conditions: LT-1 location

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
16.12.2024 – 14:00	Dry	0.4	WSW	11.0
16.12.2024 – 14:15	Dry	0.4	SW	11.1
16.12.2024 – 14:30	Dry	0.4	WSW	11.1
16.12.2024 – 14:45	Dry	0.0	WSW	11.0
16.12.2024 – 15:00	Dry	0.4	W	11.1
16.12.2024 – 15:15	Dry	0.4	W	11.0
16.12.2024 – 15:30	Dry	0.4	W	11.0
16.12.2024 – 15:45	Dry	0.4	SW	11.1
16.12.2024 – 16:00	Dry	0.4	SW	10.9
16.12.2024 – 16:15	Dry	0.4	WSW	10.9
16.12.2024 – 16:30	Dry	0.4	SW	10.8
16.12.2024 – 16:45	Dry	0.9	SW	10.8
16.12.2024 – 17:00	Dry	0.9	SW	10.7
16.12.2024 – 17:15	Dry	0.4	SW	10.5
16.12.2024 – 17:30	Dry	0.0	WSW	10.1
16.12.2024 – 17:45	Dry	0.0	NE	9.8
16.12.2024 – 18:00	Dry	0.0	WNW	9.9
16.12.2024 – 18:15	Dry	0.4	W	10.0
16.12.2024 – 18:30	Dry	0.4	SW	10.2
16.12.2024 – 18:45	Dry	0.4	WSW	10.2
16.12.2024 – 19:00	Dry	0.4	WSW	10.3
16.12.2024 – 19:15	Dry	0.4	SW	10.3
16.12.2024 – 19:30	Dry	0.0	W	10.3
16.12.2024 – 19:45	Dry	0.0	WSW	10.3
16.12.2024 – 20:00	Dry	0.0	NNE	10.4
16.12.2024 – 20:15	Dry	0.0	W	10.4
16.12.2024 – 20:30	Dry	0.4	WSW	10.6
16.12.2024 – 20:45	Dry	0.4	WSW	10.5
16.12.2024 – 21:00	Dry	0.0	SW	10.1
16.12.2024 – 21:15	Dry	0.0	N	10.1
16.12.2024 – 21:30	Dry	0.0	WNW	10.2
16.12.2024 – 21:45	Dry	0.0	WNW	10.3
16.12.2024 – 22:00	Dry	0.0	WSW	10.3
16.12.2024 – 22:15	Dry	0.0	WSW	10.4
16.12.2024 – 22:30	Dry	0.0	W	10.4
16.12.2024 – 22:45	Dry	0.0	NE	10.3
16.12.2024 – 23:00	Dry	0.0	NNW	10.3
16.12.2024 – 23:15	Dry	0.0	SW	10.3
16.12.2024 – 23:30	Dry	0.0	WSW	10.2
16.12.2024 – 23:45	Dry	0.0	NE	9.9
17.12.2024 – 00:00	Dry	0.0	---	9.6
17.12.2024 – 00:15	Dry	0.0	N	9.1
17.12.2024 – 00:30	Dry	0.0	N	8.8

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
17.12.2024 – 00:45	Dry	0.0	N	8.6
17.12.2024 – 01:00	Dry	0.0	N	8.4
17.12.2024 – 01:15	Dry	0.0	E	8.4
17.12.2024 – 01:30	Dry	0.0	SE	8.3
17.12.2024 – 01:45	Dry	0.0	NNE	8.4
17.12.2024 – 02:00	Dry	0.0	W	8.3
17.12.2024 – 02:15	Dry	0.0	E	8.5
17.12.2024 – 02:30	Dry	0.0	ESE	8.8
17.12.2024 – 02:45	Dry	0.0	ENE	8.1
17.12.2024 – 03:00	Dry	0.0	N	7.6
17.12.2024 – 03:15	Dry	0.0	N	7.4
17.12.2024 – 03:30	Dry	0.0	NE	7.1
17.12.2024 – 03:45	Dry	0.0	NNE	7.0
17.12.2024 – 04:00	Dry	0.0	N	6.7
17.12.2024 – 04:15	Dry	0.0	ESE	6.3
17.12.2024 – 04:30	Dry	0.0	ESE	6.1
17.12.2024 – 04:45	Dry	0.0	NE	6.3
17.12.2024 – 05:00	Dry	0.0	N	6.6
17.12.2024 – 05:15	Dry	0.0	ESE	6.4
17.12.2024 – 05:30	Dry	0.0	E	6.5
17.12.2024 – 05:45	Dry	0.0	N	6.7
17.12.2024 – 06:00	Dry	0.0	ESE	6.8
17.12.2024 – 06:15	Dry	0.0	E	6.9
17.12.2024 – 06:30	Dry	0.0	NNE	6.9
17.12.2024 – 06:45	Dry	0.0	N	7.1
17.12.2024 – 07:00	Dry	0.0	E	7.1
17.12.2024 – 07:15	Dry	0.0	ENE	7.1
17.12.2024 – 07:30	Dry	0.0	ESE	7.2
17.12.2024 – 07:45	Dry	0.0	E	7.4
17.12.2024 – 08:00	Dry	0.0	ESE	7.7
17.12.2024 – 08:15	Dry	0.4	E	7.8
17.12.2024 – 08:30	Dry	0.0	ESE	7.8
17.12.2024 – 08:45	Dry	0.4	E	7.8
17.12.2024 – 09:00	Dry	0.4	ENE	7.9
17.12.2024 – 09:15	Dry	0.4	ESE	8.1
17.12.2024 – 09:30	Dry	0.4	SE	8.2
17.12.2024 – 09:45	Dry	0.0	NE	8.2
17.12.2024 – 10:00	Dry	0.0	ESE	8.2
17.12.2024 – 10:15	Dry	0.4	ESE	8.1
17.12.2024 – 10:30	Dry	0.4	ESE	8.2
17.12.2024 – 10:45	Dry	0.4	NNW	8.4
17.12.2024 – 11:00	Dry	0.4	ESE	8.6
17.12.2024 – 11:15	Dry	0.4	ENE	8.6
17.12.2024 – 11:30	Dry	0.4	ENE	8.8
17.12.2024 – 11:45	Dry	0.0	ESE	9.0
17.12.2024 – 12:00	Dry	0.0	E	9.1
17.12.2024 – 12:15	Dry	0.0	ESE	9.2

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
17.12.2024 – 12:30	Dry	0.0	N	9.4
17.12.2024 – 12:45	Dry	0.4	ESE	9.8
17.12.2024 – 13:00	Dry	0.4	ESE	10.3
17.12.2024 – 13:15	Dry	0.0	WNW	10.5
17.12.2024 – 13:30	Dry	0.4	ESE	10.9
17.12.2024 – 13:45	Dry	0.4	NNW	11.2
17.12.2024 – 14:00	Dry	0.4	N	11.6
17.12.2024 – 14:15	Dry	0.0	N	11.6
17.12.2024 – 14:30	Dry	0.4	N	11.6
17.12.2024 – 14:45	Dry	0.4	ENE	11.4
17.12.2024 – 15:00	Dry	0.4	ENE	11.2
17.12.2024 – 15:15	Dry	0.4	N	10.9
17.12.2024 – 15:30	Dry	0.4	NW	10.4
17.12.2024 – 15:45	Dry	0.4	NW	10.2
17.12.2024 – 16:00	Dry	0.4	N	10.2
17.12.2024 – 16:15	Dry	0.4	NW	10.2
17.12.2024 – 16:30	Dry	0.4	NNE	10.1
17.12.2024 – 16:45	Dry	0.4	NE	10.1
17.12.2024 – 17:00	Dry	0.4	NE	10.0
17.12.2024 – 17:15	Dry	0.4	ENE	10.1
17.12.2024 – 17:30	Dry	0.4	NE	10.0
17.12.2024 – 17:45	Dry	0.4	NE	9.8
17.12.2024 – 18:00	Dry	0.4	N	9.7
17.12.2024 – 18:15	Dry	0.4	NE	9.7
17.12.2024 – 18:30	Dry	0.9	NW	9.8
17.12.2024 – 18:45	Dry	0.9	NNW	9.9
17.12.2024 – 19:00	Dry	0.4	NE	9.9
17.12.2024 – 19:15	Dry	0.4	ENE	9.7
17.12.2024 – 19:30	Dry	0.4	NNW	9.7
17.12.2024 – 19:45	Dry	0.4	N	9.7
17.12.2024 – 20:00	Dry	0.4	NNW	9.7
17.12.2024 – 20:15	Dry	0.4	NW	9.8
17.12.2024 – 20:30	Dry	0.4	NNE	9.8
17.12.2024 – 20:45	Dry	0.4	ESE	9.7
17.12.2024 – 21:00	Dry	0.4	NE	9.8
17.12.2024 – 21:15	Dry	0.4	NNW	9.9
17.12.2024 – 21:30	Dry	0.4	ESE	10.0
17.12.2024 – 21:45	Dry	0.4	N	10.1
17.12.2024 – 22:00	Dry	0.4	NE	10.0
17.12.2024 – 22:15	Dry	0.4	ENE	10.0
17.12.2024 – 22:30	Dry	0.4	NNW	10.0
17.12.2024 – 22:45	Dry	0.4	N	10.2
18.12.2024 – 23:00	Dry	0.4	NNW	10.4
18.12.2024 – 23:15	Dry	0.4	ENE	10.4
18.12.2024 – 23:30	Dry	0.4	NW	10.3
18.12.2024 – 23:45	Dry	0.4	NNW	10.3
18.12.2024 – 00:00	Dry	0.4	E	10.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
18.12.2024 – 00:15	Dry	0.4	ENE	10.4
18.12.2024 – 00:30	Dry	0.4	N	10.5
18.12.2024 – 00:45	Dry	0.4	NNW	10.6
18.12.2024 – 01:00	Dry	0.4	NNE	10.7
18.12.2024 – 01:15	Dry	0.4	NW	10.7
18.12.2024 – 01:30	Dry	0.4	NW	10.9
18.12.2024 – 01:45	Dry	0.4	NW	11.0
18.12.2024 – 02:00	Dry	0.4	NW	11.1
18.12.2024 – 02:15	Dry	0.4	ENE	11.5
18.12.2024 – 02:30	Dry	0.4	WNW	12.4
18.12.2024 – 02:45	Dry	0.9	WNW	13.5
18.12.2024 – 03:00	Dry	0.4	SE	13.5
18.12.2024 – 03:15	Dry	0.4	WNW	13.7
18.12.2024 – 03:30	Dry	0.4	N	13.8
18.12.2024 – 03:45	Dry	0.0	ENE	13.7
18.12.2024 – 04:00	Dry	0.4	N	13.9
18.12.2024 – 04:15	Dry	0.4	NNE	14.0
18.12.2024 – 04:30	Dry	0.0	N	14.2
18.12.2024 – 04:45	Dry	0.4	NW	14.4
18.12.2024 – 05:00	Dry	0.0	ESE	14.4
18.12.2024 – 05:15	Dry	0.4	SW	14.3
18.12.2024 – 05:30	Dry	0.0	SE	14.2
18.12.2024 – 05:45	Dry	0.4	SE	14.2
18.12.2024 – 06:00	Dry	0.4	WSW	13.9
18.12.2024 – 06:15	Dry	0.9	WSW	13.7
18.12.2024 – 06:30	Dry	1.3	WSW	13.8
18.12.2024 – 06:45	Dry	0.9	WSW	13.6
18.12.2024 – 07:00	Dry	1.3	WSW	13.3
18.12.2024 – 07:15	Dry	1.8	SW	13.2
18.12.2024 – 07:30	Dry	1.8	SW	13.1
18.12.2024 – 07:45	Dry	1.8	WSW	13.1
18.12.2024 – 08:00	Dry	1.8	SW	13.1
18.12.2024 – 08:15	Dry	2.2	SW	13.3
18.12.2024 – 08:30	Dry	2.2	SW	13.1
18.12.2024 – 08:45	Dry	1.8	SW	12.9
18.12.2024 – 09:00	Dry	1.3	SW	12.9
18.12.2024 – 09:15	Dry	2.2	W	13.1
18.12.2024 – 09:30	Dry	1.8	W	12.9
18.12.2024 – 09:45	Dry	2.2	W	12.6
18.12.2024 – 10:00	Dry	2.2	W	12.7
18.12.2024 – 10:15	Dry	2.7	WNW	12.5
18.12.2024 – 10:30	Dry	1.8	W	12.4
18.12.2024 – 10:45	Dry	1.8	W	12.3
18.12.2024 – 11:00	Dry	0.9	W	11.9
18.12.2024 – 11:15	Dry	0.4	W	12.1
18.12.2024 – 11:30	Dry	0.4	W	12.1
18.12.2024 – 11:45	Dry	0.4	W	12.1

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
18.12.2024 – 12:00	Dry	0.0	W	12.1
18.12.2024 – 12:15	Dry	0.0	E	11.9
18.12.2024 – 12:30	Dry	0.0	E	11.8
18.12.2024 – 12:45	Dry	0.4	WSW	11.9
18.12.2024 – 13:00	Dry	0.4	WSW	12.0
18.12.2024 – 13:15	Dry	0.4	WSW	12.1
18.12.2024 – 13:30	Dry	0.0	SW	12.1
18.12.2024 – 13:45	Dry	0.4	WSW	11.8
18.12.2024 – 14:00	Dry	0.0	SW	11.7
18.12.2024 – 14:15	Dry	0.0	W	11.5
18.12.2024 – 14:30	Dry	0.0	WSW	11.4
18.12.2024 – 14:45	Dry	0.0	WSW	11.3
18.12.2024 – 15:00	Dry	0.0	W	11.1
18.12.2024 – 15:15	Dry	0.0	WNW	10.8
18.12.2024 – 15:30	Dry	0.0	WNW	10.6
18.12.2024 – 15:45	Wet	0.0	WNW	10.3
18.12.2024 – 16:00	Wet	0.0	N	10.0
18.12.2024 – 16:15	Dry	0.0	N	9.8
18.12.2024 – 16:30	Wet	0.0	N	9.7
18.12.2024 – 16:45	Wet	0.0	N	9.7
18.12.2024 – 17:00	Dry	0.0	E	9.6
18.12.2024 – 17:15	Wet	0.0	---	9.4
18.12.2024 – 17:30	Wet	0.0	E	9.3
18.12.2024 – 17:45	Wet	0.0	E	9.4
18.12.2024 – 18:00	Wet	0.0	E	9.3
18.12.2024 – 18:15	Wet	0.0	E	9.3
18.12.2024 – 18:30	Wet	0.0	NE	9.2
18.12.2024 – 18:45	Wet	0.4	NNW	8.6
18.12.2024 – 19:00	Wet	0.0	NNE	8.4
18.12.2024 – 19:15	Wet	0.0	W	8.3
18.12.2024 – 19:30	Wet	0.0	WNW	8.2
18.12.2024 – 19:45	Wet	0.0	W	8.1
18.12.2024 – 20:00	Wet	0.4	N	7.8
18.12.2024 – 20:15	Wet	0.4	N	7.5
18.12.2024 – 20:30	Wet	0.4	NW	7.2
18.12.2024 – 20:45	Wet	0.4	NW	7.0
18.12.2024 – 21:00	Wet	0.4	NNW	6.9
18.12.2024 – 21:15	Wet	0.4	NW	6.8
18.12.2024 – 21:30	Wet	0.4	NW	6.8
18.12.2024 – 21:45	Wet	0.9	NNE	6.7
18.12.2024 – 22:00	Wet	0.4	NW	6.5
18.12.2024 – 22:15	Dry	0.0	WNW	6.4
18.12.2024 – 22:30	Dry	0.4	WNW	6.3
18.12.2024 – 22:45	Wet	0.9	W	6.4
18.12.2024 – 23:00	Wet	1.3	W	6.3
18.12.2024 – 23:15	Wet	0.9	WNW	6.3
18.12.2024 – 23:30	Wet	1.3	NNW	6.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
18.12.2024 – 23:45	Wet	1.8	NNW	5.9
19.12.2024 – 00:00	Wet	0.9	NW	5.7
19.12.2024 – 00:15	Dry	0.4	W	5.6
19.12.2024 – 00:30	Dry	0.4	W	5.6
19.12.2024 – 00:45	Wet	0.4	WNW	5.6
19.12.2024 – 01:00	Dry	0.4	NNW	5.6
19.12.2024 – 01:15	Dry	0.0	W	5.5
19.12.2024 – 01:30	Wet	0.4	W	5.2
19.12.2024 – 01:45	Wet	0.9	WNW	5.2
19.12.2024 – 02:00	Wet	1.3	NW	5.2
19.12.2024 – 02:15	Dry	0.9	NW	5.2
19.12.2024 – 02:30	Dry	0.9	NW	5.5
19.12.2024 – 02:45	Wet	0.4	NW	5.5
19.12.2024 – 03:00	Wet	1.3	NNW	5.2
19.12.2024 – 03:15	Wet	0.9	N	5.1
19.12.2024 – 03:30	Wet	0.9	NNW	4.8
19.12.2024 – 03:45	Wet	0.4	WNW	5.2
19.12.2024 – 04:00	Wet	0.9	WNW	5.0
19.12.2024 – 04:15	Wet	0.9	NW	5.4
19.12.2024 – 04:30	Dry	0.9	NW	5.4
19.12.2024 – 04:45	Dry	1.3	WNW	5.6
19.12.2024 – 05:00	Wet	1.3	W	4.6
19.12.2024 – 05:15	Wet	1.3	WNW	4.9
19.12.2024 – 05:30	Wet	1.8	NW	4.0
19.12.2024 – 05:45	Wet	0.9	NNE	4.0
19.12.2024 – 06:00	Wet	0.9	W	4.8
19.12.2024 – 06:15	Dry	1.8	W	5.1
19.12.2024 – 06:30	Wet	1.3	W	5.1
19.12.2024 – 06:45	Dry	1.3	WNW	5.1
19.12.2024 – 07:00	Dry	0.9	W	4.9
19.12.2024 – 07:15	Dry	2.2	WNW	4.6
19.12.2024 – 07:30	Dry	1.3	W	4.3
19.12.2024 – 07:45	Dry	1.8	WNW	4.6
19.12.2024 – 08:00	Wet	0.9	W	4.4
19.12.2024 – 08:15	Wet	1.3	WNW	3.9
19.12.2024 – 08:30	Wet	1.8	W	3.9
19.12.2024 – 08:45	Wet	1.3	W	3.8
19.12.2024 – 09:00	Dry	0.9	W	4.2
19.12.2024 – 09:15	Dry	0.9	NW	4.5
19.12.2024 – 09:30	Dry	0.9	N	4.6
19.12.2024 – 09:45	Wet	0.9	N	4.3
19.12.2024 – 10:00	Dry	0.9	NW	4.3
19.12.2024 – 10:15	Dry	0.4	W	4.6
19.12.2024 – 10:30	Dry	1.3	W	5.5
19.12.2024 – 10:45	Dry	1.3	W	5.0
19.12.2024 – 11:00	Dry	1.3	WSW	5.4
19.12.2024 – 11:15	Dry	1.3	W	5.9

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
19.12.2024 – 11:30	Dry	1.3	WNW	5.9
19.12.2024 – 11:45	Wet	1.8	WNW	6.1
19.12.2024 – 12:00	Dry	1.8	WNW	5.7
19.12.2024 – 12:15	Dry	1.8	W	5.7
19.12.2024 – 12:30	Dry	1.8	WNW	6.3
19.12.2024 – 12:45	Dry	1.8	W	6.4
19.12.2024 – 13:00	Dry	1.3	W	6.4
19.12.2024 – 13:15	Dry	1.3	NW	6.9
19.12.2024 – 13:30	Dry	1.8	WNW	7.3
19.12.2024 – 13:45	Dry	1.8	W	7.3
19.12.2024 – 14:00	Dry	1.8	WNW	7.2
19.12.2024 – 14:15	Dry	2.2	WNW	6.9
19.12.2024 – 14:30	Dry	2.2	WNW	7.0
19.12.2024 – 14:45	Dry	1.8	W	7.1
19.12.2024 – 15:00	Wet	1.8	W	6.9
19.12.2024 – 15:15	Dry	2.2	NNW	7.0
19.12.2024 – 15:30	Wet	1.8	NW	7.1
19.12.2024 – 15:45	Dry	1.8	W	6.9
19.12.2024 – 16:00	Dry	1.8	WNW	6.8
19.12.2024 – 16:15	Dry	1.3	W	6.9
19.12.2024 – 16:30	Dry	1.3	W	6.8
19.12.2024 – 16:45	Dry	1.3	WNW	6.8
19.12.2024 – 17:00	Dry	0.9	W	6.8
19.12.2024 – 17:15	Dry	1.3	WNW	6.5
19.12.2024 – 17:30	Dry	1.3	W	6.4
19.12.2024 – 17:45	Dry	0.9	W	6.3
19.12.2024 – 18:00	Dry	1.3	N	6.3
19.12.2024 – 18:15	Dry	0.9	W	6.3
19.12.2024 – 18:30	Dry	0.9	WNW	6.3
19.12.2024 – 18:45	Dry	0.9	WNW	6.4
19.12.2024 – 19:00	Wet	1.3	NE	6.1
19.12.2024 – 19:15	Wet	1.3	NW	5.9
19.12.2024 – 19:30	Dry	0.9	WNW	6.0
19.12.2024 – 19:45	Dry	0.4	W	5.8
19.12.2024 – 20:00	Dry	0.4	W	5.4
19.12.2024 – 20:15	Dry	0.9	W	5.4
19.12.2024 – 20:30	Dry	0.4	W	5.2
19.12.2024 – 20:45	Wet	0.4	W	5.2
19.12.2024 – 21:00	Dry	0.4	W	5.3
19.12.2024 – 21:15	Dry	0.4	WNW	5.5
19.12.2024 – 21:30	Dry	0.4	W	5.6
19.12.2024 – 21:45	Dry	0.0	W	5.2
19.12.2024 – 22:00	Dry	0.0	W	5.1
19.12.2024 – 22:15	Dry	0.0	WNW	5.2
19.12.2024 – 22:30	Dry	0.0	W	4.9
19.12.2024 – 22:45	Dry	0.0	WNW	4.5
19.12.2024 – 23:00	Dry	0.0	WSW	4.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
19.12.2024 – 23:15	Dry	0.0	WSW	4.6
19.12.2024 – 23:30	Dry	0.4	W	4.7
19.12.2024 – 23:45	Dry	0.4	W	4.7
20.12.2024 – 00:00	Dry	0.9	W	4.9
20.12.2024 – 00:15	Dry	0.4	SW	4.8
20.12.2024 – 00:30	Dry	0.4	W	4.9
20.12.2024 – 00:45	Dry	0.9	SSW	5.1
20.12.2024 – 01:00	Dry	0.4	WSW	5.2
20.12.2024 – 01:15	Dry	0.9	SW	5.6
20.12.2024 – 01:30	Dry	0.4	WSW	5.6
20.12.2024 – 01:45	Dry	0.4	SW	5.6
20.12.2024 – 02:00	Dry	0.0	SW	5.1
20.12.2024 – 02:15	Dry	0.0	W	4.6
20.12.2024 – 02:30	Dry	0.0	---	3.9
20.12.2024 – 02:45	Dry	0.0	---	3.3
20.12.2024 – 03:00	Dry	0.0	W	3.3
20.12.2024 – 03:15	Dry	0.0	SE	3.1
20.12.2024 – 03:30	Dry	0.0	E	2.7
20.12.2024 – 03:45	Dry	0.0	ESE	2.5
20.12.2024 – 04:00	Dry	0.0	ESE	2.5
20.12.2024 – 04:15	Dry	0.0	E	2.4
20.12.2024 – 04:30	Dry	0.0	E	2.4
20.12.2024 – 04:45	Dry	0.0	E	3.1
20.12.2024 – 05:00	Dry	0.0	E	3.4
20.12.2024 – 05:15	Dry	0.0	E	3.6
20.12.2024 – 05:30	Dry	0.0	ESE	3.9
20.12.2024 – 05:45	Dry	0.0	W	4.7
20.12.2024 – 06:00	Dry	0.0	WNW	4.8
20.12.2024 – 06:15	Dry	0.0	WSW	5.1
20.12.2024 – 06:30	Dry	0.0	W	5.4
20.12.2024 – 06:45	Dry	0.0	W	5.5
20.12.2024 – 07:00	Dry	0.0	ESE	5.2
20.12.2024 – 07:15	Dry	0.0	E	4.9
20.12.2024 – 07:30	Dry	0.0	SSW	5.7
20.12.2024 – 07:45	Dry	0.0	W	6.2
20.12.2024 – 08:00	Dry	0.0	SW	6.3
20.12.2024 – 08:15	Dry	0.4	WSW	6.3
20.12.2024 – 08:30	Dry	0.4	WSW	6.6
20.12.2024 – 08:45	Dry	0.4	W	6.7
20.12.2024 – 09:00	Dry	0.4	WSW	6.8
20.12.2024 – 09:15	Dry	0.4	SW	6.8
20.12.2024 – 09:30	Dry	0.4	WSW	7.1
20.12.2024 – 09:45	Dry	0.4	WSW	7.3
20.12.2024 – 10:00	Dry	0.0	ENE	7.2
20.12.2024 – 10:15	Dry	0.0	W	7.3
20.12.2024 – 10:30	Dry	0.4	WSW	7.9
20.12.2024 – 10:45	Dry	0.4	W	8.0

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
20.12.2024 – 11:00	Dry	0.0	ENE	8.1
20.12.2024 – 11:15	Dry	0.0	NW	8.3
20.12.2024 – 11:30	Dry	0.0	NE	8.5
20.12.2024 – 11:45	Dry	0.0	WSW	8.8
20.12.2024 – 12:00	Dry	0.0	W	9.0
20.12.2024 – 12:15	Dry	0.0	N	9.1
20.12.2024 – 12:30	Dry	0.0	WSW	9.2
20.12.2024 – 12:45	Wet	0.0	N	8.9
20.12.2024 – 13:00	Wet	0.0	N	8.6
20.12.2024 – 13:15	Dry	0.0	W	8.4
20.12.2024 – 13:30	Wet	0.0	ENE	8.7
20.12.2024 – 13:45	Dry	0.0	N	8.7
20.12.2024 – 14:00	Dry	0.0	WNW	8.8
20.12.2024 – 14:15	Dry	0.0	WNW	8.9
20.12.2024 – 14:30	Wet	0.0	WSW	9.2
20.12.2024 – 14:45	Wet	0.4	W	9.1
20.12.2024 – 15:00	Wet	0.4	WSW	9.2
20.12.2024 – 15:15	Dry	0.4	W	9.1
20.12.2024 – 15:30	Dry	0.9	W	9.2
20.12.2024 – 15:45	Dry	0.9	SW	9.2
20.12.2024 – 16:00	Dry	1.3	W	9.1
20.12.2024 – 16:15	Dry	1.3	WSW	8.9
20.12.2024 – 16:30	Dry	1.3	W	9.0
20.12.2024 – 16:45	Dry	1.8	W	9.1
20.12.2024 – 17:00	Dry	1.8	W	8.9
20.12.2024 – 17:15	Dry	1.3	W	8.8
20.12.2024 – 17:30	Dry	0.9	W	8.6
20.12.2024 – 17:45	Dry	1.3	W	8.5
20.12.2024 – 18:00	Dry	1.3	WSW	8.5
20.12.2024 – 18:15	Dry	1.3	W	8.4
20.12.2024 – 18:30	Dry	1.3	WSW	8.5
20.12.2024 – 18:45	Dry	1.3	W	8.4
20.12.2024 – 19:00	Dry	1.3	W	8.3
20.12.2024 – 19:15	Dry	0.9	W	8.1
20.12.2024 – 19:30	Dry	0.4	W	7.7
20.12.2024 – 19:45	Dry	0.4	W	7.5
20.12.2024 – 20:00	Dry	0.4	W	7.4
20.12.2024 – 20:15	Dry	0.4	SW	7.3
20.12.2024 – 20:30	Dry	0.4	SW	7.3
20.12.2024 – 20:45	Dry	0.4	W	7.2
20.12.2024 – 21:00	Dry	0.4	W	7.2
20.12.2024 – 21:15	Dry	0.4	W	7.2
20.12.2024 – 21:30	Dry	0.4	SW	7.2
20.12.2024 – 21:45	Dry	0.4	WSW	7.3
20.12.2024 – 22:00	Dry	0.4	W	7.3
20.12.2024 – 22:15	Dry	0.4	WSW	7.3
20.12.2024 – 22:30	Dry	0.4	W	7.2

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
20.12.2024 – 22:45	Dry	0.0	W	6.9
20.12.2024 – 23:00	Dry	0.4	W	6.9
20.12.2024 – 23:15	Dry	0.4	W	6.9
20.12.2024 – 23:30	Dry	0.0	W	6.4
20.12.2024 – 23:45	Dry	0.0	W	5.8
21.12.2024 – 00:00	Dry	0.0	W	5.2
21.12.2024 – 00:15	Dry	0.0	ESE	4.8
21.12.2024 – 00:30	Dry	0.0	ESE	4.6
21.12.2024 – 00:45	Dry	0.0	ESE	4.3
21.12.2024 – 01:00	Dry	0.0	ESE	4.2
21.12.2024 – 01:15	Dry	0.0	ESE	4.1
21.12.2024 – 01:30	Dry	0.0	W	5.5
21.12.2024 – 01:45	Dry	0.0	WNW	6.6
21.12.2024 – 02:00	Dry	0.0	WNW	7.2
21.12.2024 – 02:15	Dry	0.4	SW	7.6
21.12.2024 – 02:30	Dry	0.4	WSW	7.5
21.12.2024 – 02:45	Dry	0.4	W	7.6
21.12.2024 – 03:00	Dry	0.4	WSW	7.9
21.12.2024 – 03:15	Dry	0.0	W	7.9
21.12.2024 – 03:30	Dry	0.4	WSW	8.1
21.12.2024 – 03:45	Dry	0.0	WSW	8.3
21.12.2024 – 04:00	Dry	0.0	W	8.4
21.12.2024 – 04:15	Wet	0.4	WSW	8.3
21.12.2024 – 04:30	Wet	0.0	WSW	8.3
21.12.2024 – 04:45	Wet	0.4	SW	8.3
21.12.2024 – 05:00	Dry	0.0	W	8.3
21.12.2024 – 05:15	Dry	0.0	WSW	8.2
21.12.2024 – 05:30	Dry	0.4	SW	8.3
21.12.2024 – 05:45	Dry	0.0	WSW	8.5
21.12.2024 – 06:00	Dry	0.0	E	8.5
21.12.2024 – 06:15	Wet	0.0	WSW	8.7
21.12.2024 – 06:30	Wet	0.4	WSW	8.8
21.12.2024 – 06:45	Dry	0.4	W	9.1
21.12.2024 – 07:00	Dry	0.4	SW	9.5
21.12.2024 – 07:15	Dry	0.9	SW	9.9
21.12.2024 – 07:30	Wet	0.9	WSW	10.0
21.12.2024 – 07:45	Dry	0.4	SW	10.3
21.12.2024 – 08:00	Dry	0.9	W	10.5
21.12.2024 – 08:15	Dry	0.9	SW	10.6
21.12.2024 – 08:30	Dry	0.9	SW	10.9
21.12.2024 – 08:45	Dry	0.9	SW	10.9
21.12.2024 – 09:00	Dry	0.9	SW	11.1
21.12.2024 – 09:15	Dry	1.3	SW	11.2
21.12.2024 – 09:30	Dry	0.9	SW	11.4
21.12.2024 – 09:45	Dry	0.9	SW	11.6
21.12.2024 – 10:00	Dry	0.9	SW	11.6
21.12.2024 – 10:15	Wet	1.3	SW	11.5

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
21.12.2024 – 10:30	Dry	1.3	SSW	11.5
21.12.2024 – 10:45	Dry	1.8	SW	11.7
21.12.2024 – 11:00	Wet	2.2	SW	12.1
21.12.2024 – 11:15	Dry	2.7	W	12.3
21.12.2024 – 11:30	Dry	2.7	WNW	12.2
21.12.2024 – 11:45	Dry	2.7	W	11.8
21.12.2024 – 12:00	Dry	2.2	W	11.4
21.12.2024 – 12:15	Dry	1.8	W	11.3
21.12.2024 – 12:30	Dry	1.8	WNW	11.5
21.12.2024 – 12:45	Dry	1.8	WSW	11.5
21.12.2024 – 13:00	Dry	1.8	W	11.1
21.12.2024 – 13:15	Dry	2.2	W	10.9
21.12.2024 – 13:30	Dry	2.2	W	10.8
21.12.2024 – 13:45	Dry	2.2	SW	10.8
21.12.2024 – 14:00	Dry	2.2	SW	10.5
21.12.2024 – 14:15	Dry	2.2	WSW	10.2
21.12.2024 – 14:30	Dry	1.8	SW	10.2
21.12.2024 – 14:45	Dry	2.2	W	10.2
21.12.2024 – 15:00	Dry	2.2	W	10.1
21.12.2024 – 15:15	Dry	1.8	WSW	10.1
21.12.2024 – 15:30	Dry	2.2	W	9.9
21.12.2024 – 15:45	Dry	1.8	SW	9.7
21.12.2024 – 16:00	Dry	2.2	W	7.9
21.12.2024 – 16:15	Dry	1.3	SW	8.2
21.12.2024 – 16:30	Dry	1.3	WSW	8.3
21.12.2024 – 16:45	Dry	1.3	SW	8.3
21.12.2024 – 17:00	Dry	1.3	SW	8.6
21.12.2024 – 17:15	Dry	1.8	SW	8.7
21.12.2024 – 17:30	Dry	1.3	WSW	8.4
21.12.2024 – 17:45	Dry	0.9	SW	8.2
21.12.2024 – 18:00	Dry	0.9	SW	7.9
21.12.2024 – 18:15	Dry	1.3	SW	8.3
21.12.2024 – 18:30	Dry	1.8	W	8.1
21.12.2024 – 18:45	Dry	1.3	W	8.2
21.12.2024 – 19:00	Wet	1.8	W	7.1
21.12.2024 – 19:15	Wet	1.8	W	6.1
21.12.2024 – 19:30	Dry	0.4	W	5.9
21.12.2024 – 19:45	Dry	0.4	SW	6.4
21.12.2024 – 20:00	Dry	1.3	SW	6.8
21.12.2024 – 20:15	Dry	2.2	W	7.1
21.12.2024 – 20:30	Dry	1.8	W	7.1
21.12.2024 – 20:45	Dry	1.3	WSW	7.1
21.12.2024 – 21:00	Dry	1.3	SW	6.9
21.12.2024 – 21:15	Dry	0.9	SSW	6.7
21.12.2024 – 21:30	Dry	1.3	SW	6.7
21.12.2024 – 21:45	Dry	1.3	SW	6.8
21.12.2024 – 22:00	Dry	1.3	SW	6.7

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
21.12.2024 – 22:15	Dry	1.3	SW	6.6
21.12.2024 – 22:30	Dry	1.8	W	6.7
21.12.2024 – 22:45	Dry	1.3	SW	6.6
21.12.2024 – 23:00	Dry	1.8	SW	6.8
21.12.2024 – 23:15	Dry	2.2	SW	6.7
21.12.2024 – 23:30	Wet	1.8	SSW	5.4
21.12.2024 – 23:45	Dry	1.3	SW	5.7
22.12.2024 – 00:00	Dry	1.8	SW	5.9
22.12.2024 – 00:15	Dry	1.8	SW	6.0
22.12.2024 – 00:30	Dry	2.2	WSW	5.6
22.12.2024 – 00:45	Wet	2.2	W	5.1
22.12.2024 – 01:00	Wet	2.2	W	4.8
22.12.2024 – 01:15	Wet	2.7	W	4.0
22.12.2024 – 01:30	Dry	3.1	WNW	4.0
22.12.2024 – 01:45	Dry	2.2	W	4.3
22.12.2024 – 02:00	Dry	2.2	WNW	4.7
22.12.2024 – 02:15	Dry	2.2	W	4.4
22.12.2024 – 02:30	Dry	2.2	W	4.4
22.12.2024 – 02:45	Wet	2.2	W	4.3
22.12.2024 – 03:00	Dry	2.2	SW	4.6
22.12.2024 – 03:15	Dry	2.7	W	4.8
22.12.2024 – 03:30	Dry	2.7	W	4.9
22.12.2024 – 03:45	Dry	2.2	W	4.6
22.12.2024 – 04:00	Dry	1.8	WSW	4.6
22.12.2024 – 04:15	Wet	1.8	SW	4.5
22.12.2024 – 04:30	Dry	2.2	SW	4.4
22.12.2024 – 04:45	Dry	2.7	W	4.4
22.12.2024 – 05:00	Dry	2.2	W	4.5
22.12.2024 – 05:15	Dry	1.8	SW	4.4
22.12.2024 – 05:30	Dry	1.8	SW	4.4
22.12.2024 – 05:45	Dry	2.2	WSW	4.7
22.12.2024 – 06:00	Dry	2.2	WSW	4.4
22.12.2024 – 06:15	Dry	2.2	SSW	4.4
22.12.2024 – 06:30	Dry	2.2	SW	4.4
22.12.2024 – 06:45	Dry	2.2	W	4.6
22.12.2024 – 07:00	Dry	2.2	SW	4.7
22.12.2024 – 07:15	Wet	1.8	SW	4.1
22.12.2024 – 07:30	Wet	2.2	W	4.0
22.12.2024 – 07:45	Dry	2.2	SW	4.2
22.12.2024 – 08:00	Wet	3.1	W	4.5
22.12.2024 – 08:15	Dry	2.7	W	4.3
22.12.2024 – 08:30	Dry	2.2	W	3.9
22.12.2024 – 08:45	Wet	2.2	W	3.9
22.12.2024 – 09:00	Wet	2.2	SW	3.9
22.12.2024 – 09:15	Dry	2.2	W	4.3
22.12.2024 – 09:30	Dry	2.2	W	4.7
22.12.2024 – 09:45	Dry	1.8	SW	4.7

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
22.12.2024 – 10:00	Wet	1.3	SW	3.9
22.12.2024 – 10:15	Dry	2.2	SW	4.6
22.12.2024 – 10:30	Dry	1.8	W	5.0
22.12.2024 – 10:45	Dry	2.2	SW	5.3
22.12.2024 – 11:00	Wet	2.7	W	5.1
22.12.2024 – 11:15	Wet	2.2	W	4.8
22.12.2024 – 11:30	Wet	2.7	W	4.5
22.12.2024 – 11:45	Wet	3.1	W	5.2
22.12.2024 – 12:00	Wet	3.1	W	5.4
22.12.2024 – 12:15	Dry	2.7	WNW	5.8
22.12.2024 – 12:30	Wet	2.7	NW	5.2
22.12.2024 – 12:45	Wet	2.7	WNW	4.6
22.12.2024 – 13:00	Wet	2.2	NNW	4.8
22.12.2024 – 13:15	Wet	2.2	NW	5.4
22.12.2024 – 13:30	Wet	3.6	W	6.2
22.12.2024 – 13:45	Wet	3.6	WNW	6.7
22.12.2024 – 14:00	Dry	3.1	WSW	7.1
22.12.2024 – 14:15	Wet	3.6	W	7.3
22.12.2024 – 14:30	Dry	2.2	NW	7.0
22.12.2024 – 14:45	Wet	2.7	W	5.9
22.12.2024 – 15:00	Wet	2.2	WNW	5.7
22.12.2024 – 15:15	Dry	2.2	WSW	6.2
22.12.2024 – 15:30	Dry	2.2	WNW	6.3
22.12.2024 – 15:45	Wet	2.2	WNW	6.6
22.12.2024 – 16:00	Wet	2.7	NW	6.6
22.12.2024 – 16:15	Wet	2.7	W	6.4
22.12.2024 – 16:30	Dry	2.7	WNW	6.7
22.12.2024 – 16:45	Dry	2.7	W	6.9
22.12.2024 – 17:00	Dry	2.7	W	7.2
22.12.2024 – 17:15	Dry	2.2	NNW	7.4
22.12.2024 – 17:30	Dry	2.7	NW	7.3
22.12.2024 – 17:45	Wet	2.7	NW	7.5
22.12.2024 – 18:00	Dry	2.7	NW	7.4
22.12.2024 – 18:15	Dry	2.7	WNW	7.3
22.12.2024 – 18:30	Dry	2.2	NW	7.3
22.12.2024 – 18:45	Dry	3.1	N	7.3
22.12.2024 – 19:00	Dry	2.2	W	7.2
22.12.2024 – 19:15	Dry	2.2	W	7.1
22.12.2024 – 19:30	Dry	1.8	W	7.0
22.12.2024 – 19:45	Dry	1.8	WNW	7.2
22.12.2024 – 20:00	Dry	1.8	NW	7.1
22.12.2024 – 20:15	Dry	1.8	NW	6.7
22.12.2024 – 20:30	Dry	1.8	NW	6.6
22.12.2024 – 20:45	Dry	1.3	WNW	6.9
22.12.2024 – 21:00	Dry	1.3	WNW	6.9
22.12.2024 – 21:15	Dry	1.8	NW	6.7
22.12.2024 – 21:30	Dry	1.3	WNW	6.7

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
22.12.2024 – 21:45	Dry	2.2	NW	6.9
22.12.2024 – 22:00	Dry	2.7	NNW	6.8
22.12.2024 – 22:15	Dry	2.2	NW	6.7
22.12.2024 – 22:30	Dry	1.8	NNW	6.5
22.12.2024 – 22:45	Dry	2.7	WNW	6.8
22.12.2024 – 23:00	Dry	1.8	NW	6.6
22.12.2024 – 23:15	Dry	1.8	NNW	6.6
22.12.2024 – 23:30	Dry	2.7	N	6.8
22.12.2024 – 23:45	Dry	2.2	NW	6.7
23.12.2024 – 00:00	Dry	2.2	NW	6.8
23.12.2024 – 00:15	Dry	2.2	NNW	6.8
23.12.2024 – 00:30	Dry	1.8	NW	6.7
23.12.2024 – 00:45	Dry	2.2	WNW	6.8
23.12.2024 – 01:00	Dry	1.8	NW	6.7
23.12.2024 – 01:15	Dry	1.8	NW	6.7
23.12.2024 – 01:30	Dry	0.9	NW	6.2
23.12.2024 – 01:45	Dry	0.9	NW	6.2
23.12.2024 – 02:00	Dry	1.3	NW	6.4
23.12.2024 – 02:15	Dry	1.3	WNW	6.3
23.12.2024 – 02:30	Dry	1.3	W	6.3
23.12.2024 – 02:45	Dry	1.3	W	6.3
23.12.2024 – 03:00	Dry	1.3	W	6.4
23.12.2024 – 03:15	Dry	1.3	NW	6.3
23.12.2024 – 03:30	Dry	1.3	NW	6.3
23.12.2024 – 03:45	Dry	1.3	N	6.3
23.12.2024 – 04:00	Dry	1.3	NNW	6.2
23.12.2024 – 04:15	Dry	0.9	NW	6.1
23.12.2024 – 04:30	Dry	0.9	WNW	6.2
23.12.2024 – 04:45	Dry	0.9	NW	6.1
23.12.2024 – 05:00	Dry	0.9	W	6.2
23.12.2024 – 05:15	Dry	0.9	WNW	6.1
23.12.2024 – 05:30	Dry	0.9	W	6.0
23.12.2024 – 05:45	Dry	0.9	W	5.9
23.12.2024 – 06:00	Dry	0.9	W	5.8
23.12.2024 – 06:15	Dry	0.9	NW	5.7
23.12.2024 – 06:30	Dry	0.4	NW	5.9
23.12.2024 – 06:45	Dry	0.9	WNW	6.1
23.12.2024 – 07:00	Dry	0.4	WNW	6.1
23.12.2024 – 07:15	Dry	0.4	W	6.2
23.12.2024 – 07:30	Dry	0.4	W	6.3
23.12.2024 – 07:45	Dry	0.9	WNW	6.4
23.12.2024 – 08:00	Dry	0.9	W	6.4
23.12.2024 – 08:15	Dry	0.4	W	6.3
23.12.2024 – 08:30	Dry	0.4	W	6.3
23.12.2024 – 08:45	Dry	0.0	W	6.2
23.12.2024 – 09:00	Dry	0.4	W	6.5
23.12.2024 – 09:15	Dry	0.4	W	6.6

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
23.12.2024 – 09:30	Dry	0.4	W	6.6
23.12.2024 – 09:45	Dry	0.9	W	6.8
23.12.2024 – 10:00	Dry	0.9	W	7.0
23.12.2024 – 10:15	Dry	0.4	W	7.0

Source: Mott MacDonald

Table 12-10 Meteorological conditions: LT-2 location

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
13.11.2024 – 11:30	Dry	0.4	SW	10.1
13.11.2024 – 11:45	Dry	0.4	WNW	11.1
13.11.2024 – 12:00	Dry	0.9	WNW	11.4
13.11.2024 – 12:15	Dry	0.4	W	11.6
13.11.2024 – 12:30	Dry	0.9	NW	11.5
13.11.2024 – 12:45	Dry	0.9	W	11.7
13.11.2024 – 13:00	Dry	0.4	WNW	11.7
13.11.2024 – 13:15	Dry	0.4	WNW	11.7
13.11.2024 – 13:30	Dry	0.4	W	11.5
13.11.2024 – 13:45	Dry	0.4	W	11.3
13.11.2024 – 14:00	Dry	0.4	WNW	11.4
13.11.2024 – 14:15	Dry	0.9	NW	11.5
13.11.2024 – 14:30	Dry	0.9	NW	11.4
13.11.2024 – 14:45	Dry	0.9	W	11.2
13.11.2024 – 15:00	Dry	0.4	WNW	11.2
13.11.2024 – 15:15	Dry	0.4	W	11.0
13.11.2024 – 15:30	Dry	0.4	WNW	10.9
13.11.2024 – 15:45	Dry	0.4	WNW	10.8
13.11.2024 – 16:00	Dry	0.4	NW	10.7
13.11.2024 – 16:15	Dry	0.4	WNW	10.4
13.11.2024 – 16:30	Dry	0.4	W	10.2
13.11.2024 – 16:45	Dry	0.4	WNW	10.2
13.11.2024 – 17:00	Dry	0.4	WNW	10.2
13.11.2024 – 17:15	Dry	0.4	WNW	10.3
13.11.2024 – 17:30	Dry	0.4	WNW	10.4
13.11.2024 – 17:45	Dry	0.4	WNW	10.6
13.11.2024 – 18:00	Dry	0.0	NW	10.5
13.11.2024 – 18:15	Dry	0.4	NW	10.6
13.11.2024 – 18:30	Dry	0.4	NW	10.6
13.11.2024 – 18:45	Dry	0.9	WNW	10.7
13.11.2024 – 19:00	Dry	0.9	NW	10.8
13.11.2024 – 19:15	Dry	0.4	WNW	10.8
13.11.2024 – 19:30	Dry	0.4	NW	10.8
13.11.2024 – 19:45	Dry	0.9	NW	11.1
13.11.2024 – 20:00	Dry	0.9	NW	11.1
13.11.2024 – 20:15	Dry	0.9	WNW	11.2
13.11.2024 – 20:30	Dry	1.3	NW	11.3
13.11.2024 – 20:45	Dry	0.9	WNW	11.4
13.11.2024 – 21:00	Dry	0.4	NW	11.4
13.11.2024 – 21:15	Dry	0.4	NW	11.5
13.11.2024 – 21:30	Dry	0.4	WNW	11.7
13.11.2024 – 21:45	Dry	0.4	NW	11.7
13.11.2024 – 22:00	Dry	0.4	WNW	11.8
13.11.2024 – 22:15	Dry	0.9	NW	11.9
13.11.2024 – 22:30	Dry	0.4	WNW	11.9

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
13.11.2024 – 22:45	Dry	0.9	WNW	11.9
13.11.2024 – 23:00	Dry	0.4	NW	11.9
13.11.2024 – 23:15	Dry	0.4	NNW	11.9
13.11.2024 – 23:30	Dry	0.4	WNW	12.0
13.11.2024 – 23:45	Dry	0.4	WNW	12.0
14.11.2024 – 00:00	Dry	0.9	WNW	12.1
14.11.2024 – 00:15	Dry	0.9	WNW	12.2
14.11.2024 – 00:30	Dry	0.9	WNW	12.4
14.11.2024 – 00:45	Dry	0.9	NW	12.4
14.11.2024 – 01:00	Dry	0.9	WNW	12.4
14.11.2024 – 01:15	Dry	0.9	WNW	12.3
14.11.2024 – 01:30	Dry	0.9	WNW	12.2
14.11.2024 – 01:45	Dry	0.9	W	12.2
14.11.2024 – 02:00	Dry	0.9	WNW	12.1
14.11.2024 – 02:15	Dry	0.9	WNW	12.0
14.11.2024 – 02:30	Dry	0.9	WNW	11.9
14.11.2024 – 02:45	Dry	0.4	WNW	11.9
14.11.2024 – 03:00	Dry	0.4	NW	11.9
14.11.2024 – 03:15	Dry	0.9	NW	11.9
14.11.2024 – 03:30	Dry	0.4	WNW	11.8
14.11.2024 – 03:45	Dry	0.4	WNW	11.9
14.11.2024 – 04:00	Dry	0.4	WNW	11.9
14.11.2024 – 04:15	Dry	0.4	WNW	11.8
14.11.2024 – 04:30	Dry	0.0	W	11.7
14.11.2024 – 04:45	Dry	0.4	W	11.7
14.11.2024 – 05:00	Dry	0.0	W	11.6
14.11.2024 – 05:15	Dry	0.0	WSW	11.6
14.11.2024 – 05:30	Dry	0.0	W	11.5
14.11.2024 – 05:45	Dry	0.0	W	11.4
14.11.2024 – 06:00	Dry	0.0	W	11.3
14.11.2024 – 06:15	Dry	0.0	WNW	11.2
14.11.2024 – 06:30	Dry	0.0	W	11.1
14.11.2024 – 06:45	Dry	0.0	NW	10.9
14.11.2024 – 07:00	Dry	0.0	W	10.8
14.11.2024 – 07:15	Dry	0.0	WNW	10.8
14.11.2024 – 07:30	Dry	0.0	W	10.6
14.11.2024 – 07:45	Dry	0.0	NW	10.4
14.11.2024 – 08:00	Dry	0.4	WNW	10.3
14.11.2024 – 08:15	Dry	0.0	WNW	10.2
14.11.2024 – 08:30	Dry	0.0	WNW	10.1
14.11.2024 – 08:45	Dry	0.0	S	10.2
14.11.2024 – 09:00	Dry	0.0	SW	10.1
14.11.2024 – 09:15	Dry	0.0	SW	10.2
14.11.2024 – 09:30	Dry	0.0	SW	10.1
14.11.2024 – 09:45	Dry	0.0	SW	10.3
14.11.2024 – 10:00	Dry	0.0	SW	10.5
14.11.2024 – 10:15	Dry	0.4	SW	10.6

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
14.11.2024 – 10:30	Dry	0.4	SSW	10.7
14.11.2024 – 10:45	Dry	0.0	SW	10.9
14.11.2024 – 11:00	Dry	0.4	SW	11.1
14.11.2024 – 11:15	Dry	0.4	SSW	11.2
14.11.2024 – 11:30	Dry	0.4	SW	11.6
14.11.2024 – 11:45	Dry	0.4	SW	11.8
14.11.2024 – 12:00	Dry	0.0	SSW	11.9
14.11.2024 – 12:15	Dry	0.4	SW	11.9
14.11.2024 – 12:30	Dry	0.4	SSW	12.0
14.11.2024 – 12:45	Dry	0.0	SSW	12.2
14.11.2024 – 13:00	Dry	0.4	SSW	12.2
14.11.2024 – 13:15	Dry	0.0	SSW	12.2
14.11.2024 – 13:30	Dry	0.0	N	12.0
14.11.2024 – 13:45	Dry	0.0	W	12.2
14.11.2024 – 14:00	Wet	0.0	W	11.9
14.11.2024 – 14:15	Dry	0.0	SW	11.8
14.11.2024 – 14:30	Dry	0.0	WSW	11.7
14.11.2024 – 14:45	Dry	0.0	WNW	11.6
14.11.2024 – 15:00	Dry	0.0	SSE	11.7
14.11.2024 – 15:15	Dry	0.0	SW	11.6
14.11.2024 – 15:30	Dry	0.0	SW	11.4
14.11.2024 – 15:45	Dry	0.0	SW	11.3
14.11.2024 – 16:00	Dry	0.0	SSW	11.1
14.11.2024 – 16:15	Dry	0.0	SSW	10.7
14.11.2024 – 16:30	Dry	0.0	SW	10.3
14.11.2024 – 16:45	Dry	0.0	SW	10.0
14.11.2024 – 17:00	Dry	0.0	SW	9.6
14.11.2024 – 17:15	Dry	0.0	SW	8.6
14.11.2024 – 17:30	Dry	0.0	SW	8.2
14.11.2024 – 17:45	Dry	0.0	SSW	8.2
14.11.2024 – 18:00	Dry	0.0	SW	7.9
14.11.2024 – 18:15	Dry	0.0	SW	7.8
14.11.2024 – 18:30	Dry	0.0	SW	7.8
14.11.2024 – 18:45	Dry	0.0	SW	7.3
14.11.2024 – 19:00	Dry	0.0	SSW	7.0
14.11.2024 – 19:15	Dry	0.0	SSW	6.8
14.11.2024 – 19:30	Dry	0.0	SSW	6.4
14.11.2024 – 19:45	Dry	0.0	SSW	6.1
14.11.2024 – 20:00	Dry	0.0	SSE	5.9
14.11.2024 – 20:15	Dry	0.0	---	5.6
14.11.2024 – 20:30	Dry	0.0	---	5.2
14.11.2024 – 20:45	Dry	0.0	---	4.8
14.11.2024 – 21:00	Dry	0.0	---	4.6
14.11.2024 – 21:15	Dry	0.0	---	4.5
14.11.2024 – 21:30	Dry	0.0	---	4.8
14.11.2024 – 21:45	Dry	0.0	---	4.6
14.11.2024 – 22:00	Dry	0.0	---	4.7

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
14.11.2024 – 22:15	Dry	0.0	SW	4.9
14.11.2024 – 22:30	Dry	0.0	SW	5.0
14.11.2024 – 22:45	Dry	0.0	SW	5.1
14.11.2024 – 23:00	Dry	0.0	SSW	5.3
14.11.2024 – 23:15	Dry	0.0	SSW	5.6
14.11.2024 – 23:30	Dry	0.0	---	5.9
14.11.2024 – 23:45	Dry	0.0	---	6.1
15.11.2024 – 00:00	Dry	0.0	---	6.3
15.11.2024 – 00:15	Dry	0.0	---	6.3
15.11.2024 – 00:30	Dry	0.0	---	6.3
15.11.2024 – 00:45	Dry	0.0	SSE	6.3
15.11.2024 – 01:00	Dry	0.0	SSW	6.3
15.11.2024 – 01:15	Dry	0.0	SSW	6.1
15.11.2024 – 01:30	Dry	0.0	SSE	6.1
15.11.2024 – 01:45	Dry	0.0	SSW	6.2
15.11.2024 – 02:00	Dry	0.0	SSW	6.3
15.11.2024 – 02:15	Dry	0.0	SE	6.3
15.11.2024 – 02:30	Dry	0.0	WNW	6.3
15.11.2024 – 02:45	Dry	0.0	SW	6.3
15.11.2024 – 03:00	Dry	0.0	SSW	6.2
15.11.2024 – 03:15	Dry	0.0	SSW	6.1
15.11.2024 – 03:30	Dry	0.0	SSW	6.2
15.11.2024 – 03:45	Dry	0.0	---	6.2
15.11.2024 – 04:00	Dry	0.0	SSW	6.3
15.11.2024 – 04:15	Dry	0.0	SSW	6.3
15.11.2024 – 04:30	Dry	0.0	SSW	6.3
15.11.2024 – 04:45	Dry	0.0	SSW	6.4
15.11.2024 – 05:00	Dry	0.0	SSW	6.4
15.11.2024 – 05:15	Dry	0.0	SSW	6.4
15.11.2024 – 05:30	Dry	0.0	SW	6.4
15.11.2024 – 05:45	Dry	0.4	SW	6.6
15.11.2024 – 06:00	Dry	0.4	SW	6.5
15.11.2024 – 06:15	Dry	0.4	SSW	6.4
15.11.2024 – 06:30	Dry	0.4	SW	6.5
15.11.2024 – 06:45	Dry	0.4	SSW	6.6
15.11.2024 – 07:00	Dry	0.4	SSW	6.6
15.11.2024 – 07:15	Dry	0.4	SSW	6.6
15.11.2024 – 07:30	Dry	0.4	SW	6.6
15.11.2024 – 07:45	Dry	0.4	SSW	6.6
15.11.2024 – 08:00	Dry	0.4	SSE	6.5
15.11.2024 – 08:15	Dry	0.4	SW	6.6
15.11.2024 – 08:30	Dry	0.4	SW	6.8
15.11.2024 – 08:45	Dry	0.4	SW	6.9
15.11.2024 – 09:00	Dry	0.4	SW	7.0
15.11.2024 – 09:15	Dry	0.4	SSW	7.4
15.11.2024 – 09:30	Dry	0.4	SW	7.8
15.11.2024 – 09:45	Dry	0.4	SW	8.1

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
15.11.2024 – 10:00	Dry	0.9	SSW	8.3
15.11.2024 – 10:15	Dry	0.9	SSW	8.8
15.11.2024 – 10:30	Dry	0.9	SSW	9.1
15.11.2024 – 10:45	Dry	0.4	SSW	9.4
15.11.2024 – 11:00	Wet	0.4	SW	10.0
15.11.2024 – 11:15	Dry	0.4	SW	10.7
15.11.2024 – 11:30	Dry	0.9	SE	10.9
15.11.2024 – 11:45	Dry	0.4	SW	11.3
15.11.2024 – 12:00	Dry	0.4	SSW	12.0
15.11.2024 – 12:15	Dry	0.4	N	12.9
15.11.2024 – 12:30	Dry	0.4	N	13.2
15.11.2024 – 12:45	Dry	0.4	ENE	13.2
15.11.2024 – 13:00	Dry	0.4	NE	13.2
15.11.2024 – 13:15	Dry	0.9	NE	13.1
15.11.2024 – 13:30	Dry	0.4	NNE	13.0
15.11.2024 – 13:45	Dry	0.4	N	13.1
15.11.2024 – 14:00	Dry	0.4	NNE	12.9
15.11.2024 – 14:15	Dry	0.4	ENE	12.9
15.11.2024 – 14:30	Dry	0.4	N	13.1
15.11.2024 – 14:45	Dry	0.0	NNE	13.1
15.11.2024 – 15:00	Dry	0.0	NNE	13.1
15.11.2024 – 15:15	Dry	0.0	NNE	13.1
15.11.2024 – 15:30	Dry	0.4	NE	12.9
15.11.2024 – 15:45	Dry	0.0	NE	12.8
15.11.2024 – 16:00	Dry	0.4	SE	12.4
15.11.2024 – 16:15	Dry	0.0	NNE	11.8
15.11.2024 – 16:30	Dry	0.0	SSW	11.2
15.11.2024 – 16:45	Dry	0.4	SSW	10.9
15.11.2024 – 17:00	Dry	0.0	---	10.2
15.11.2024 – 17:15	Dry	0.0	SSW	9.9
15.11.2024 – 17:30	Dry	0.0	SSW	9.4
15.11.2024 – 17:45	Dry	0.0	SSW	8.6
15.11.2024 – 18:00	Dry	0.0	SSW	8.1
15.11.2024 – 18:15	Dry	0.0	SW	8.7
15.11.2024 – 18:30	Dry	0.0	SSW	9.2
15.11.2024 – 18:45	Dry	0.0	SW	9.6
15.11.2024 – 19:00	Dry	0.0	S	9.8
15.11.2024 – 19:15	Dry	0.0	SW	10.1
15.11.2024 – 19:30	Dry	0.0	SSW	9.9
15.11.2024 – 19:45	Dry	0.0	SSW	9.5
15.11.2024 – 20:00	Dry	0.4	SSW	9.0
15.11.2024 – 20:15	Dry	0.4	SSW	9.2
15.11.2024 – 20:30	Dry	0.4	S	9.6
15.11.2024 – 20:45	Dry	0.4	S	10.3
15.11.2024 – 21:00	Dry	0.0	SSE	10.3
15.11.2024 – 21:15	Dry	0.0	SSE	10.1
15.11.2024 – 21:30	Dry	0.0	SSW	9.8

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
15.11.2024 – 21:45	Dry	0.0	SSW	9.7
15.11.2024 – 22:00	Dry	0.0	SSE	10.1
15.11.2024 – 22:15	Dry	0.4	SSE	10.6
15.11.2024 – 22:30	Dry	0.0	SSE	10.9
15.11.2024 – 22:45	Dry	0.0	NE	11.1
15.11.2024 – 23:00	Dry	0.4	ESE	11.2
15.11.2024 – 23:15	Dry	0.4	NE	11.2
15.11.2024 – 23:30	Dry	0.4	E	11.3
15.11.2024 – 23:45	Dry	0.4	NNE	11.4
16.11.2024 – 00:00	Dry	0.4	ENE	11.3
16.11.2024 – 00:15	Dry	0.4	N	11.3
16.11.2024 – 00:30	Dry	0.4	ENE	11.3
16.11.2024 – 00:45	Dry	0.4	NE	11.1
16.11.2024 – 01:00	Dry	0.0	ENE	10.9
16.11.2024 – 01:15	Dry	0.0	SSE	10.7
16.11.2024 – 01:30	Dry	0.0	SSE	10.7
16.11.2024 – 01:45	Dry	0.0	---	10.7
16.11.2024 – 02:00	Dry	0.0	NNE	11.0
16.11.2024 – 02:15	Dry	0.4	N	11.2
16.11.2024 – 02:30	Dry	0.4	E	11.3
16.11.2024 – 02:45	Dry	0.0	ENE	11.3
16.11.2024 – 03:00	Dry	0.0	SSE	11.2
16.11.2024 – 03:15	Dry	0.0	SSW	11.1
16.11.2024 – 03:30	Dry	0.4	SSW	11.0
16.11.2024 – 03:45	Dry	0.0	SSE	11.1
16.11.2024 – 04:00	Dry	0.4	N	11.7
16.11.2024 – 04:15	Dry	0.4	N	11.9
16.11.2024 – 04:30	Dry	0.0	N	11.8
16.11.2024 – 04:45	Dry	0.0	WNW	11.7
16.11.2024 – 05:00	Dry	0.0	ENE	11.7
16.11.2024 – 05:15	Dry	0.0	---	11.6
16.11.2024 – 05:30	Dry	0.0	SSE	11.4
16.11.2024 – 05:45	Dry	0.0	---	11.3
16.11.2024 – 06:00	Dry	0.0	WNW	11.2
16.11.2024 – 06:15	Dry	0.4	WNW	11.6
16.11.2024 – 06:30	Dry	0.0	W	11.6
16.11.2024 – 06:45	Dry	0.0	WNW	11.6
16.11.2024 – 07:00	Dry	0.0	W	11.6
16.11.2024 – 07:15	Dry	0.0	S	11.5
16.11.2024 – 07:30	Dry	0.0	SSW	11.6
16.11.2024 – 07:45	Dry	0.0	SSW	11.7
16.11.2024 – 08:00	Dry	0.0	WNW	11.8
16.11.2024 – 08:15	Dry	0.0	SSW	11.7
16.11.2024 – 08:30	Dry	0.0	S	11.6
16.11.2024 – 08:45	Dry	0.0	SW	11.7
16.11.2024 – 09:00	Dry	0.0	SSE	11.7
16.11.2024 – 09:15	Dry	0.4	NW	11.9

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
16.11.2024 – 09:30	Dry	0.4	NW	12.0
16.11.2024 – 09:45	Wet	0.9	NW	11.2
16.11.2024 – 10:00	Wet	0.4	W	10.4
16.11.2024 – 10:15	Wet	0.4	WNW	10.2
16.11.2024 – 10:30	Wet	0.4	W	10.0
16.11.2024 – 10:45	Wet	0.4	W	9.9
16.11.2024 – 11:00	Wet	0.4	W	9.9
16.11.2024 – 11:15	Dry	0.9	WNW	9.6
16.11.2024 – 11:30	Wet	0.9	WNW	9.4
16.11.2024 – 11:45	Dry	0.9	WNW	9.5
16.11.2024 – 12:00	Dry	0.9	WNW	9.4
16.11.2024 – 12:15	Dry	0.9	NW	9.4
16.11.2024 – 12:30	Dry	1.3	WNW	9.6
16.11.2024 – 12:45	Dry	1.3	NW	9.9
16.11.2024 – 13:00	Dry	0.9	WNW	10.0
16.11.2024 – 13:15	Dry	1.3	NW	10.2
16.11.2024 – 13:30	Dry	0.9	WNW	10.4
16.11.2024 – 13:45	Dry	1.3	WNW	10.5
16.11.2024 – 14:00	Dry	0.9	NW	10.6
16.11.2024 – 14:15	Dry	1.3	NW	10.6
16.11.2024 – 14:30	Dry	1.3	WNW	10.3
16.11.2024 – 14:45	Dry	1.3	NW	10.3
16.11.2024 – 15:00	Dry	0.9	WNW	10.3
16.11.2024 – 15:15	Dry	0.9	NW	10.2
16.11.2024 – 15:30	Dry	0.9	WNW	10.1
16.11.2024 – 15:45	Dry	0.4	NW	10.1
16.11.2024 – 16:00	Dry	0.9	NW	10.0
16.11.2024 – 16:15	Dry	0.4	NW	10.0
16.11.2024 – 16:30	Dry	0.4	NW	9.9
16.11.2024 – 16:45	Dry	0.4	WNW	9.8
16.11.2024 – 17:00	Dry	0.4	NNW	9.7
16.11.2024 – 17:15	Dry	0.4	WNW	9.3
16.11.2024 – 17:30	Dry	0.4	NW	9.0
16.11.2024 – 17:45	Dry	0.4	NW	9.1
16.11.2024 – 18:00	Dry	0.4	NW	9.2
16.11.2024 – 18:15	Dry	0.9	NW	9.3
16.11.2024 – 18:30	Dry	0.4	NW	9.1
16.11.2024 – 18:45	Dry	0.4	NW	8.8
16.11.2024 – 19:00	Dry	0.4	N	8.8
16.11.2024 – 19:15	Dry	0.4	NNW	8.7
16.11.2024 – 19:30	Dry	0.0	NNW	8.7
16.11.2024 – 19:45	Dry	0.4	NW	8.8
16.11.2024 – 20:00	Dry	0.4	NW	8.7
16.11.2024 – 20:15	Dry	0.4	NW	8.6
16.11.2024 – 20:30	Dry	0.4	WNW	8.7
16.11.2024 – 20:45	Dry	0.4	NW	8.8
16.11.2024 – 21:00	Dry	0.4	NNW	8.9

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
16.11.2024 – 21:15	Dry	0.9	NNW	8.7
16.11.2024 – 21:30	Dry	0.4	NE	8.5
16.11.2024 – 21:45	Dry	0.9	WNW	8.4
16.11.2024 – 22:00	Wet	0.9	NW	8.4
16.11.2024 – 22:15	Dry	0.4	NNW	8.3
16.11.2024 – 22:30	Dry	0.4	WNW	8.4
16.11.2024 – 22:45	Dry	0.9	WNW	8.6
16.11.2024 – 23:00	Dry	0.9	NW	8.8
16.11.2024 – 23:15	Dry	0.9	WNW	9.0
16.11.2024 – 23:30	Dry	1.3	NW	9.2
16.11.2024 – 23:45	Dry	1.8	WNW	9.2
17.11.2024 – 00:00	Dry	1.3	WNW	9.3
17.11.2024 – 00:15	Dry	1.3	NW	9.3
17.11.2024 – 00:30	Dry	1.8	WNW	9.3
17.11.2024 – 00:45	Dry	1.3	NW	9.3
17.11.2024 – 01:00	Dry	1.3	WNW	9.3
17.11.2024 – 01:15	Dry	1.3	NW	9.2
17.11.2024 – 01:30	Dry	1.8	NW	9.3
17.11.2024 – 01:45	Dry	1.8	NW	9.3
17.11.2024 – 02:00	Dry	1.3	WNW	9.2
17.11.2024 – 02:15	Dry	1.8	NW	9.1
17.11.2024 – 02:30	Dry	1.3	NW	9.1
17.11.2024 – 02:45	Dry	1.3	NW	9.1
17.11.2024 – 03:00	Dry	1.8	NW	9.1
17.11.2024 – 03:15	Dry	1.3	W	8.4
17.11.2024 – 03:30	Dry	0.9	WNW	7.9
17.11.2024 – 03:45	Dry	0.4	WNW	7.7
17.11.2024 – 04:00	Dry	0.4	NW	7.7
17.11.2024 – 04:15	Dry	0.0	NW	7.8
17.11.2024 – 04:30	Dry	0.0	WNW	7.7
17.11.2024 – 04:45	Wet	0.9	WNW	7.5
17.11.2024 – 05:00	Wet	0.9	WNW	6.9
17.11.2024 – 05:15	Wet	0.9	NW	7.1
17.11.2024 – 05:30	Dry	0.4	WNW	7.2
17.11.2024 – 05:45	Dry	0.0	WNW	7.1
17.11.2024 – 06:00	Dry	0.0	W	6.9
17.11.2024 – 06:15	Dry	0.0	WSW	6.7
17.11.2024 – 06:30	Dry	0.0	NW	6.8
17.11.2024 – 06:45	Dry	0.0	NW	6.7
17.11.2024 – 07:00	Dry	0.0	WNW	6.6
17.11.2024 – 07:15	Dry	0.0	WNW	6.4
17.11.2024 – 07:30	Dry	0.0	SW	6.4
17.11.2024 – 07:45	Dry	0.0	SSW	6.4
17.11.2024 – 08:00	Wet	0.4	WNW	6.8
17.11.2024 – 08:15	Dry	0.0	NNE	6.9
17.11.2024 – 08:30	Dry	0.0	NNW	6.9
17.11.2024 – 08:45	Dry	0.0	ESE	7.0

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
17.11.2024 – 09:00	Dry	0.4	NNW	7.3
17.11.2024 – 09:15	Dry	0.4	NNE	7.7
17.11.2024 – 09:30	Dry	0.9	NE	7.7
17.11.2024 – 09:45	Dry	0.4	NNE	7.8
17.11.2024 – 10:00	Dry	0.4	NNW	7.9
17.11.2024 – 10:15	Dry	0.4	NW	8.2
17.11.2024 – 10:30	Dry	0.4	NW	8.2
17.11.2024 – 10:45	Dry	0.4	WNW	8.6
17.11.2024 – 11:00	Wet	0.4	NW	8.8
17.11.2024 – 11:15	Dry	0.9	NNW	9.1
17.11.2024 – 11:30	Dry	0.9	NW	9.1
17.11.2024 – 11:45	Dry	0.9	NNE	8.9
17.11.2024 – 12:00	Wet	0.9	NW	8.7
17.11.2024 – 12:15	Dry	0.4	WNW	8.9
17.11.2024 – 12:30	Dry	0.0	NW	9.1
17.11.2024 – 12:45	Dry	0.4	N	9.3
17.11.2024 – 13:00	Dry	0.4	NW	9.5
17.11.2024 – 13:15	Dry	0.4	NW	9.5
17.11.2024 – 13:30	Dry	0.4	NW	9.4
17.11.2024 – 13:45	Dry	0.4	N	9.3
17.11.2024 – 14:00	Dry	0.4	N	9.1
17.11.2024 – 14:15	Dry	0.4	NW	8.9
17.11.2024 – 14:30	Dry	0.4	N	8.9
17.11.2024 – 14:45	Dry	0.4	NW	8.9
17.11.2024 – 15:00	Dry	0.4	NW	9.0
17.11.2024 – 15:15	Dry	0.4	NW	9.0
17.11.2024 – 15:30	Dry	0.9	NW	8.9
17.11.2024 – 15:45	Dry	0.9	NW	8.9
17.11.2024 – 16:00	Wet	1.3	NW	8.2
17.11.2024 – 16:15	Wet	0.9	WNW	8.1
17.11.2024 – 16:30	Dry	0.4	WNW	7.9
17.11.2024 – 16:45	Dry	0.0	WNW	7.9
17.11.2024 – 17:00	Dry	0.4	NW	8.0
17.11.2024 – 17:15	Dry	0.4	NW	8.3
17.11.2024 – 17:30	Dry	0.9	WNW	8.3
17.11.2024 – 17:45	Dry	0.4	WSW	8.0
17.11.2024 – 18:00	Dry	0.0	WSW	7.5
17.11.2024 – 18:15	Wet	0.0	WSW	7.2
17.11.2024 – 18:30	Dry	0.0	WSW	6.9
17.11.2024 – 18:45	Wet	0.0	SW	6.8
17.11.2024 – 19:00	Dry	0.0	---	6.6
17.11.2024 – 19:15	Dry	0.0	---	6.2
17.11.2024 – 19:30	Dry	0.0	SSW	5.8
17.11.2024 – 19:45	Dry	0.0	SW	5.8
17.11.2024 – 20:00	Dry	0.0	SW	5.7
17.11.2024 – 20:15	Dry	0.0	SSW	5.6
17.11.2024 – 20:30	Dry	0.0	SSW	5.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
17.11.2024 – 20:45	Dry	0.0	SW	5.6
17.11.2024 – 21:00	Wet	0.0	SW	5.9
17.11.2024 – 21:15	Dry	0.0	SW	6.3
17.11.2024 – 21:30	Dry	0.0	NE	6.6
17.11.2024 – 21:45	Dry	0.0	NNE	6.8
17.11.2024 – 22:00	Dry	0.0	N	7.0
17.11.2024 – 22:15	Dry	0.0	W	6.9
17.11.2024 – 22:30	Wet	0.0	N	6.8
17.11.2024 – 22:45	Wet	0.0	ESE	7.1
17.11.2024 – 23:00	Wet	0.0	NNW	7.2
17.11.2024 – 23:15	Dry	0.0	WNW	7.0
17.11.2024 – 23:30	Dry	0.0	WNW	6.9
17.11.2024 – 23:45	Dry	0.0	---	6.6
18.11.2024 – 00:00	Dry	0.0	---	6.6
18.11.2024 – 00:15	Dry	0.0	WNW	6.6
18.11.2024 – 00:30	Wet	0.0	---	6.4
18.11.2024 – 00:45	Wet	0.0	WSW	6.5
18.11.2024 – 01:00	Wet	0.0	SSW	6.5
18.11.2024 – 01:15	Wet	0.0	NNW	6.4
18.11.2024 – 01:30	Wet	0.4	WNW	6.8
18.11.2024 – 01:45	Wet	0.0	NW	6.8
18.11.2024 – 02:00	Dry	0.0	NW	6.7
18.11.2024 – 02:15	Dry	0.0	NNW	6.4
18.11.2024 – 02:30	Dry	0.0	W	6.4
18.11.2024 – 02:45	Dry	0.0	---	6.2
18.11.2024 – 03:00	Dry	0.0	---	6.1
18.11.2024 – 03:15	Dry	0.0	WSW	6.1
18.11.2024 – 03:30	Dry	0.0	---	6.0
18.11.2024 – 03:45	Dry	0.0	---	5.9
18.11.2024 – 04:00	Dry	0.0	---	5.3
18.11.2024 – 04:15	Dry	0.0	---	4.9
18.11.2024 – 04:30	Dry	0.0	---	4.8
18.11.2024 – 04:45	Wet	0.0	WSW	5.2
18.11.2024 – 05:00	Dry	0.0	W	5.0
18.11.2024 – 05:15	Dry	0.0	---	4.7
18.11.2024 – 05:30	Dry	0.0	---	4.8
18.11.2024 – 05:45	Dry	0.0	WSW	5.0
18.11.2024 – 06:00	Dry	0.0	---	4.9
18.11.2024 – 06:15	Dry	0.0	---	4.4
18.11.2024 – 06:30	Dry	0.0	---	3.7
18.11.2024 – 06:45	Dry	0.0	---	3.3
18.11.2024 – 07:00	Dry	0.0	---	3.1
18.11.2024 – 07:15	Dry	0.0	---	2.9
18.11.2024 – 07:30	Dry	0.0	---	2.7
18.11.2024 – 07:45	Dry	0.0	---	2.5
18.11.2024 – 08:00	Dry	0.0	SW	2.9
18.11.2024 – 08:15	Dry	0.0	---	3.1

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
18.11.2024 – 08:30	Dry	0.0	---	3.2
18.11.2024 – 08:45	Dry	0.0	---	3.3
18.11.2024 – 09:00	Dry	0.0	---	3.7
18.11.2024 – 09:15	Dry	0.0	SW	4.0
18.11.2024 – 09:30	Dry	0.0	SW	4.4
18.11.2024 – 09:45	Dry	0.0	ESE	4.4
18.11.2024 – 10:00	Dry	0.0	SW	4.6
18.11.2024 – 10:15	Dry	0.0	SSW	4.7
18.11.2024 – 10:30	Dry	0.0	SSW	5.0
18.11.2024 – 10:45	Wet	0.4	SW	5.2
18.11.2024 – 11:00	Dry	0.4	SW	5.3
18.11.2024 – 11:15	Dry	0.0	SW	5.6
18.11.2024 – 11:30	Dry	0.0	SSW	5.9
18.11.2024 – 11:45	Dry	0.4	SW	6.2
18.11.2024 – 12:00	Dry	0.4	SW	6.1
18.11.2024 – 12:15	Dry	0.4	SSW	6.2
18.11.2024 – 12:30	Dry	0.0	ESE	5.9
18.11.2024 – 12:45	Dry	0.4	SSE	5.8
18.11.2024 – 13:00	Dry	0.4	E	5.8
18.11.2024 – 13:15	Dry	0.4	SSW	5.9
18.11.2024 – 13:30	Dry	0.4	SW	5.9
18.11.2024 – 13:45	Dry	0.4	SW	5.8
18.11.2024 – 14:00	Dry	0.4	SSE	5.8
18.11.2024 – 14:15	Dry	0.4	SSW	5.7
18.11.2024 – 14:30	Dry	0.4	S	5.6
18.11.2024 – 14:45	Dry	0.4	SE	5.6
18.11.2024 – 15:00	Dry	0.4	SSW	5.6
18.11.2024 – 15:15	Dry	0.4	SW	5.4
18.11.2024 – 15:30	Wet	0.4	SE	5.4
18.11.2024 – 15:45	Wet	0.0	SSW	5.4
18.11.2024 – 16:00	Wet	0.0	SSW	5.2
18.11.2024 – 16:15	Wet	0.4	SE	5.0
18.11.2024 – 16:30	Wet	0.4	SE	4.9
18.11.2024 – 16:45	Wet	0.4	SSE	4.8
18.11.2024 – 17:00	Wet	0.4	E	4.4
18.11.2024 – 17:15	Wet	0.0	SE	4.3
18.11.2024 – 17:30	Wet	0.4	SE	4.0
18.11.2024 – 17:45	Wet	0.4	E	3.8
18.11.2024 – 18:00	Wet	0.4	SE	3.5
18.11.2024 – 18:15	Wet	0.4	SSE	3.2
18.11.2024 – 18:30	Wet	0.4	ENE	2.8
18.11.2024 – 18:45	Wet	0.4	ESE	2.7
18.11.2024 – 19:00	Wet	0.4	ENE	2.4
18.11.2024 – 19:15	Wet	0.4	E	2.2
18.11.2024 – 19:30	Wet	0.4	ESE	1.9
18.11.2024 – 19:45	Wet	0.4	E	1.7
18.11.2024 – 20:00	Wet	0.4	SE	1.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
18.11.2024 – 20:15	Wet	0.0	SW	0.9
18.11.2024 – 20:30	Dry	0.0	WSW	0.7
18.11.2024 – 20:45	Dry	0.0	SW	0.6
18.11.2024 – 21:00	Dry	0.0	SW	0.5
18.11.2024 – 21:15	Dry	0.0	SE	0.6
18.11.2024 – 21:30	Dry	0.0	---	0.5
18.11.2024 – 21:45	Dry	0.0	WSW	0.4
18.11.2024 – 22:00	Dry	0.0	WSW	0.3
18.11.2024 – 22:15	Dry	0.0	---	0.3
18.11.2024 – 22:30	Dry	0.0	---	0.3
18.11.2024 – 22:45	Dry	0.0	---	0.3
18.11.2024 – 23:00	Wet	0.0	---	0.4
18.11.2024 – 23:15	Dry	0.0	SW	0.5
18.11.2024 – 23:30	Dry	0.0	WNW	0.6
18.11.2024 – 23:45	Wet	0.0	NE	0.6
19.11.2024 – 00:00	Dry	0.4	WSW	0.6
19.11.2024 – 00:15	Wet	0.0	SSE	0.6
19.11.2024 – 00:30	Dry	0.0	WSW	0.6
19.11.2024 – 00:45	Wet	0.0	SW	0.6
19.11.2024 – 01:00	Dry	0.0	SE	0.5
19.11.2024 – 01:15	Wet	0.0	---	0.6
19.11.2024 – 01:30	Dry	0.0	W	0.5
19.11.2024 – 01:45	Dry	0.0	W	0.5
19.11.2024 – 02:00	Dry	0.0	SSW	0.6
19.11.2024 – 02:15	Wet	0.0	NNW	0.6
19.11.2024 – 02:30	Dry	0.0	NW	0.5
19.11.2024 – 02:45	Dry	0.0	NNW	0.4
19.11.2024 – 03:00	Dry	0.0	NW	0.3
19.11.2024 – 03:15	Dry	0.0	---	0.3
19.11.2024 – 03:30	Wet	0.0	---	0.2
19.11.2024 – 03:45	Dry	0.0	---	0.2
19.11.2024 – 04:00	Dry	0.0	---	0.2
19.11.2024 – 04:15	Dry	0.0	WNW	0.2
19.11.2024 – 04:30	Dry	0.0	WNW	0.2
19.11.2024 – 04:45	Dry	0.0	WNW	0.2
19.11.2024 – 05:00	Dry	0.0	WNW	0.2
19.11.2024 – 05:15	Dry	0.0	WNW	0.2
19.11.2024 – 05:30	Dry	0.0	---	0.2
19.11.2024 – 05:45	Dry	0.0	WSW	0.3
19.11.2024 – 06:00	Dry	0.0	---	0.3
19.11.2024 – 06:15	Dry	0.0	---	0.3
19.11.2024 – 06:30	Wet	0.0	---	0.3
19.11.2024 – 06:45	Dry	0.0	---	0.3
19.11.2024 – 07:00	Dry	0.0	---	0.3
19.11.2024 – 07:15	Dry	0.0	---	0.3
19.11.2024 – 07:30	Dry	0.0	---	0.3
19.11.2024 – 07:45	Dry	0.0	---	0.3

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
19.11.2024 – 08:00	Dry	0.0	---	0.3
19.11.2024 – 08:15	Dry	0.0	WNW	0.4
19.11.2024 – 08:30	Dry	0.0	NW	0.5
19.11.2024 – 08:45	Dry	0.0	---	0.6
19.11.2024 – 09:00	Wet	0.0	---	0.7
19.11.2024 – 09:15	Dry	0.0	---	0.7
19.11.2024 – 09:30	Dry	0.0	WNW	0.8
19.11.2024 – 09:45	Dry	0.0	NNW	0.9
19.11.2024 – 10:00	Dry	0.0	NNW	1.1
19.11.2024 – 10:15	Wet	0.0	NNW	1.2
19.11.2024 – 10:30	Dry	0.0	NNW	1.4
19.11.2024 – 10:45	Wet	0.0	WNW	1.6
19.11.2024 – 11:00	Wet	0.0	NW	1.8
19.11.2024 – 11:15	Wet	0.0	WNW	2.2
19.11.2024 – 11:30	Wet	0.0	NW	2.2
19.11.2024 – 11:45	Wet	0.0	WNW	2.6
19.11.2024 – 12:00	Wet	0.0	WNW	2.8
19.11.2024 – 12:15	Wet	0.4	WNW	2.7
19.11.2024 – 12:30	Wet	0.4	WNW	2.8
19.11.2024 – 12:45	Wet	0.4	WNW	2.8
19.11.2024 – 13:00	Wet	0.4	WNW	2.9
19.11.2024 – 13:15	Wet	0.4	WNW	3.0
19.11.2024 – 13:30	Wet	0.4	WNW	3.1
19.11.2024 – 13:45	Wet	0.0	WNW	3.2
19.11.2024 – 14:00	Wet	0.4	NW	3.2
19.11.2024 – 14:15	Wet	0.4	WNW	3.2
19.11.2024 – 14:30	Wet	0.0	WNW	3.2
19.11.2024 – 14:45	Wet	0.0	WNW	3.1
19.11.2024 – 15:00	Wet	0.0	NW	3.0
19.11.2024 – 15:15	Dry	0.0	WNW	2.8
19.11.2024 – 15:30	Wet	0.0	W	2.6
19.11.2024 – 15:45	Dry	0.0	---	2.2
19.11.2024 – 16:00	Dry	0.0	W	1.9
19.11.2024 – 16:15	Dry	0.0	---	1.5
19.11.2024 – 16:30	Wet	0.0	NNW	1.4
19.11.2024 – 16:45	Dry	0.0	---	1.1
19.11.2024 – 17:00	Dry	0.0	WSW	1.4
19.11.2024 – 17:15	Dry	0.0	WSW	1.5
19.11.2024 – 17:30	Dry	0.0	---	1.2
19.11.2024 – 17:45	Dry	0.0	---	0.9
19.11.2024 – 18:00	Dry	0.0	W	1.4
19.11.2024 – 18:15	Dry	0.0	W	1.7
19.11.2024 – 18:30	Dry	0.0	WNW	1.6
19.11.2024 – 18:45	Dry	0.0	WNW	1.6
19.11.2024 – 19:00	Dry	0.0	WNW	1.9
19.11.2024 – 19:15	Dry	0.0	WNW	2.1
19.11.2024 – 19:30	Dry	0.4	WNW	2.4

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
19.11.2024 – 19:45	Dry	0.4	W	2.6
19.11.2024 – 20:00	Dry	0.4	W	2.6
19.11.2024 – 20:15	Dry	0.4	WNW	2.8
19.11.2024 – 20:30	Dry	0.4	WNW	2.6
19.11.2024 – 20:45	Dry	0.0	WNW	2.3
19.11.2024 – 21:00	Dry	0.0	WSW	2.0
19.11.2024 – 21:15	Dry	0.0	W	1.7
19.11.2024 – 21:30	Dry	0.0	W	2.3
19.11.2024 – 21:45	Dry	0.4	W	2.4
19.11.2024 – 22:00	Dry	0.4	WNW	2.5
19.11.2024 – 22:15	Dry	0.4	NW	2.6
19.11.2024 – 22:30	Dry	0.0	WNW	2.2
19.11.2024 – 22:45	Dry	0.4	NW	2.6
19.11.2024 – 23:00	Dry	0.4	WNW	2.6
19.11.2024 – 23:15	Dry	0.4	NW	2.4
19.11.2024 – 23:30	Dry	0.4	NW	2.7
19.11.2024 – 23:45	Dry	0.4	NW	2.8
20.11.2024 – 00:00	Dry	0.4	WNW	2.8
20.11.2024 – 00:15	Wet	0.4	W	2.9
20.11.2024 – 00:30	Dry	0.0	WSW	2.6
20.11.2024 – 00:45	Dry	0.0	WSW	1.7
20.11.2024 – 01:00	Dry	0.0	W	0.8
20.11.2024 – 01:15	Dry	0.0	---	0.2
20.11.2024 – 01:30	Dry	0.0	ESE	1.1
20.11.2024 – 01:45	Dry	0.0	SW	1.6
20.11.2024 – 02:00	Dry	0.0	SSW	1.7
20.11.2024 – 02:15	Dry	0.9	NNW	2.7
20.11.2024 – 02:30	Dry	0.4	WNW	2.6
20.11.2024 – 02:45	Dry	0.0	WNW	2.3
20.11.2024 – 03:00	Wet	0.4	NNW	1.8
20.11.2024 – 03:15	Wet	0.0	NNW	1.7
20.11.2024 – 03:30	Dry	0.0	SSW	1.5
20.11.2024 – 03:45	Dry	0.0	S	1.4
20.11.2024 – 04:00	Wet	0.4	SSW	1.5
20.11.2024 – 04:15	Wet	0.4	S	1.6
20.11.2024 – 04:30	Wet	0.0	SSW	1.4
20.11.2024 – 04:45	Dry	0.0	S	1.3
20.11.2024 – 05:00	Wet	0.4	SSW	1.6
20.11.2024 – 05:15	Wet	0.4	NE	1.9
20.11.2024 – 05:30	Wet	0.4	N	2.1
20.11.2024 – 05:45	Wet	0.0	NW	1.9
20.11.2024 – 06:00	Wet	0.0	W	2.0
20.11.2024 – 06:15	Dry	0.0	NNW	1.7
20.11.2024 – 06:30	Dry	0.0	NNW	1.8
20.11.2024 – 06:45	Wet	0.0	S	1.7
20.11.2024 – 07:00	Dry	0.0	SW	1.5
20.11.2024 – 07:15	Dry	0.0	SW	1.1

Date and Time	Conditions	Wind Speed (m/s)	Wind Direction	Temperature (°C)
20.11.2024 – 07:30	Dry	0.0	SSW	0.6
20.11.2024 – 07:45	Dry	0.0	S	0.5
20.11.2024 – 08:00	Dry	0.0	WSW	0.7
20.11.2024 – 08:15	Dry	0.0	SSW	0.7
20.11.2024 – 08:30	Dry	0.0	SW	1.0
20.11.2024 – 08:45	Dry	0.0	---	1.5
20.11.2024 – 09:00	Dry	0.0	NNW	1.8
20.11.2024 – 09:15	Dry	0.0	SSW	2.1
20.11.2024 – 09:30	Wet	0.0	SSW	2.7
20.11.2024 – 09:45	Dry	0.0	WNW	2.8
20.11.2024 – 10:00	Wet	0.4	NW	2.9
20.11.2024 – 10:15	Dry	0.4	WNW	3.2
20.11.2024 – 10:30	Wet	0.9	NW	3.5
20.11.2024 – 10:45	Wet	0.9	WNW	3.8
20.11.2024 – 11:00	Wet	0.9	NW	3.7
20.11.2024 – 11:15	Wet	0.9	WNW	3.4

Source: Mott MacDonald

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 12: Noise and Vibration Appendix

B: Construction Noise

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Contents

Tables

12. Construction Noise Assessment

12.1 Introduction

12.1.1 Tables 12-1 to 12-9 show the indicative plant inventory for each element of the Scheme's construction, as provided by Mott MacDonald's construction engineers. The associated sound levels have been derived by the appendices of BS5228-1 or from relevant manufacturers' data, where available. The likely percentage of the construction day for which a given item of plant may be operating has been assigned using professional judgement. The noise data for individual plant items has been aggregated with appropriate adjustments for percentage operating time and likely the number of units of a given item operating simultaneously to determine an activity noise level for use in plant noise calculations.

Table 12-1 Plant inventory for construction compound establishment

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Site clearance	Forestry forwarder	D.9.49	Tractor pulling dump truck	1	50	85	92
	Chainsaw	D.2.14	Petrol driven chain saw	1	50	86	
	8t excavator	C.2.8	Wheeled backhoe loader	1	50	68	
	Stihl saw	C.4.70	Petrol hand-held circular saw	1	25	91	
	16t excavator and hydraulic breaker	C.1.1	Breaker mount on wheeled backhoe	1	50	92	
Fencing	8t excavator	C.2.8	Wheeled backhoe loader	1	50	68	67
	Auger attachment (to excavator)	C.3.23	Tracked excavator	1	25	68	

Table 12-2 Plant inventory for demolitions

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Demolition of buildings	Excavator	C.1.13	Tracked excavator	1	50	86	87
	Excavator with breaker/ grab	C.1.14	Tracked crusher	1	50	87	
	Tipper lorry	C.6.21	Road lorry (full)	1	25	80	
	Crane	C.4.43	Wheeled mobile crane	1	25	70	
Demolition of River Dee Bridge	16t excavator and hydraulic breaker	C.1.1	Breaker mount on wheeled backhoe	1	50	92	90
	Large (250 – 400t) Mobile Cranes	C.2.27	Wheeled loader	1	50	80	
	SPMTs	C.4.57	Lifting platform	1	50	67	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	MEWP	C.4.59	Diesel scissor lift	1	50	78	
	Hand Held Pneumatic Tools	C.5.4	Road breaker (hand-held pneumatic)	1	50	86	
	Crash deck	C.4.58	Lifting platform (idling)	1	50	63	

Table 12-3 Plant inventory for construction of carriageways (including tie-ins)

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Site clearance	Forestry forwarder	D.9.49	Tractor pulling dump truck	1	50	85	91
	Chainsaw	D.2.14	Petrol driven chain saw	1	25	86	
	8t excavator	C.2.8	Wheeled backhoe loader	1	50	68	
	Stihl saw	C.4.73	Hand-held circular saw (cutting paving slabs)	1	25	84	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	16t excavator and hydraulic breaker	C1.1	Breaker mount on wheeled backhoe	1	50	92	
Drainage	JCB Excavator	C.2.27	Wheeled loader	1	50	80	79
	8t Excavator	C.2.8	Wheeled backhoe loader	1	50	68	
	20t Excavator	C.2.21	Tracked excavator	1	50	71	
	16t Excavator	C.2.24	Tracked excavator	1	50	73	
	8t Dumper	C.4.5	Dumper (idling)	2	50	63	
Earthworks	16t Excavator	C.2.24	Tracked excavator	1	50	73	82
	Dozer	C.2.12	Dozer	1	50	81	
	9t Dumper	C.4.5	Dumper (idling)	2	50	63	
	Roller Bomag BW 219 D-4	C.2.36	Dozer (tower roller)	1	50	81	
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	50	70	
River Dee Bridge in River Works and Abutments	Bored Piling Rig	C.3.14	Large rotary bored piling rig	1	50	83	84
	Concrete Pumps	C.3.25	Concrete pump	1	50	78	
	Concrete Mixer Trucks	C.4.27	Concrete mixer truck	2	50	79	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	Large (250 – 400t) Mobile Cranes	C.4.50	Tracked mobile crane	1	50	71	
	2 No Barges and SPMTs	C.4.57	Lifting platform	2	50	67	
	20t / 30t Wheeled Excavators	C.5.11	Wheeled excavator	1	50	73	
	20t Road Wagons / 25T All Terrain Dump-trucks	D.7.121	Lorry (pulling up)	3	50	70	
River Dee Bridge	Large (1000t) Mobile Cranes	C.4.50	Tracked mobile crane (600t)	1	50	71	84
	Medium Sized Vibrating Rollers	C.5.20	Vibratory roller (8.9t)	1	50	75	
	Surfacing Machines	C.5.31	Asphalt paver (+ tipper lorry)	1	50	77	
	MEWP	C.4.59	Diesel scissor lift	1	50	78	
	Hand Held Pneumatic Tools	C.5.4	Road breaker (hand0held pneumatic)	1	50	86	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Pavement Foundation Construction	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	50	77	76
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	50	70	
Pavement	Roller Bomag 120	C.5.25	Vibratory roller (32kW)	1	50	75	88
	Roller Bomag BW 24	C.5.20	Vibratory roller (98kW)	1	50	75	
	JCB 2cx with hydraulic breaker	C.5.1	Backhoe mounted hydraulic breaker	1	50	88	
	Paver	C.5.31	Asphalt paver (+ tipper lorry)	1	50	77	
	Excavator with breaker/ grab	C.1.14	Tracked crusher	1	50	87	
Signs and Lines	3t Excavator	C.5.5	Tracked excavator	1	50	74	76
	Hi-ab	C.5.53	Lorry with lifting boom	1	50	77	
	12t white lining truck	D.7.121	Lorry (pulling up)	1	50	70	
VRS and Lighting	3t Excavator	C.5.5	Tracked excavator	1	50	74	76

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	Hi-ab	C.5.53	Lorry with lifting boom	1	50	77	

Table 12-4 Plant inventory for installation of new River Dee Bridge

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Install new River Dee Bridge and Abutments	Bored Piling Rig	C.3.14	Large rotary bored piling rig	1	50	83	86
	Concrete Pumps	C.3.25	Concrete pump	1	50	78	
	Concrete Mixer Trucks	C.4.27	Concrete mixer truck	1	50	79	
	Large (1000t) Mobile Cranes	C.4.50	Tracked mobile crane (600t)	1	50	71	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	SPMTs	C.4.57	Lifting platform	1	50	67	
	20t / 30t Wheeled Excavators	C.5.11	Wheeled excavator (17t)	1	50	73	
	20t Road Wagons / 25T All Terrain Dump-trucks	D.7.121	Lorry (pulling up)	3	50	70	
	MEWP	C.4.59	Diesel scissor lift	1	50	78	
	Hand Held Pneumatic Tools	C.5.4	Road breaker (hand-held pneumatic)	1	50	86	

Table 12-5 Plant inventory for accommodation works to the existing Riverside Way

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Earthworks	16t Excavator	C.2.24	Tracked excavator	1	50	73	79
	Dozer	C.2.12	Dozer	1	50	81	
	9t Dumper	C.4.5	Dumper (idling)	2	50	63	
Pavement Foundation Construction	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	50	77	79
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	50	70	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	50	77	
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	50	70	
Pavement	Roller Bomag 120	C.5.25	Vibratory roller (32kW)	1	50	75	87
	Roller Bomag BW 24	C.5.20	Vibratory roller (98kW)	1	50	75	
	JCB 2cx with hydraulic breaker	C.5.1	Backhoe mounted hydraulic breaker	1	50	88	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	W 200 Hi cold milling machine (Planer)	C.5.7	Road planer	1	50	82	
	Paver	C.5.31	Asphalt paver (+ tipper lorry)	1	50	77	

Table 12-6 Plant inventory for construction of cycleways

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Site clearance	Forestry forwarder	D.9.49	Tractor pulling dump truck	1	50	85	91
	Chainsaw	D.2.14	Petrol driven chain saw	1	25	86	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	8t excavator	C.2.8	Wheeled backhoe loader	1	50	68	
	Stihl saw	C.4.73	Hand-held circular saw (cutting paving slabs)	1	25	84	
	16t excavator and hydraulic breaker	C1.1	Breaker mount on wheeled backhoe	1	50	92	
Earthworks	16t Excavator	C.2.24	Tracked excavator	1	50	73	79
	Dozer	C.2.12	Dozer	1	50	81	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	9t Dumper	C.4.5	Dumper (idling)	2	50	63	
Cycleway Foundation Construction	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	50	77	81
	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	50	77	
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	50	70	
	9t Dumper	C.4.5	Dumper (idling)	2	50	63	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Cycleway Construction	Roller Bomag 120	C.5.25	Vibratory roller (32kW)	1	50	75	86
	Roller Bomag BW 24	C.5.20	Vibratory roller (98kW)	1	50	75	
	JCB 2cx with hydraulic breaker	C.5.1	Backhoe mounted hydraulic breaker	1	50	88	
	W 200 Hi cold milling machine (Planer)	C.5.7	Road planer	1	10	82	
	Paver	C.5.31	Asphalt paver (+ tipper lorry)	1	50	77	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Signs and Lines	3t Excavator	C.5.5	Tracked excavator	1	50	74	77
	Hi-ab	C.5.53	Lorry with lifting boom	1	50	77	
	12t white lining truck	D.7.121	Lorry (pulling up)	3	50	70	

Table 12-7 Plant inventory for construction of pumping station

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Temporary Works	22t Excavator	C.2.3	Tracked Excavator	3	80	78	82
	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	10	77	
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	20	70	

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	4in Water pump	C.2.46	Water pump	1	50	62	
Reinforced Concrete Boxes	Crane	C.4.43	Wheeled mobile crane	1	50	70	74
	Concrete Pumps	C.3.25	Concrete pump	1	10	78	
	Concrete Mixer Trucks	C.4.27	Concrete mixer truck	2	10	79	
Backfill	22t Excavator	C.2.3	Tracked Excavator	3	80	78	82
	Roller Bomag BW 219 D-4	C.5.26	Vibratory roller	1	10	77	
	Road Wagons 8 wheeled 20t	D.7.121	Lorry (pulling up)	3	20	70	

Table 12-8 Plant inventory for miscellaneous directional drilling activities

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Utilities installation	22t Excavator	C.2.3	Tracked Excavator	3	80	78	85

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
	8t / 350 bar Concrete pump and mixer truck (discharging)	C.4.24	Concrete pump and mixer truck	1	50	67	
	4in Water pump	C.2.46	Water pump	1	50	62	
	Directional drill (generator)	C.2.44	Directional drill	1	100	78	
	29t Dump Truck (tipping fill)	C.2.30	Dump Truck	2	80	79	

Table 12-9 Plant inventory for temporary jetty construction

Construction Activity	Equipment Name	BS 5228 reference	BS5228 description	no. units	% on time	L_{Aeq} at 10m (dB)	Activity L_{Aeq} at 10m (dB)
Installation and removal of temporary jetty's	HGV (deliveries)	C.2.34	Lorry	2	20	80	82
	Telehandler	C.4.54	Telescopic handler	1	10	79	
	Cherry picker	C.4.50	Tracked mobile crane	1	70	71	
	150T crawler crane	C.4.38	Wheeled mobile telescopic crane	1	70	78	
	Vibrating pile installer	C.3.8	Vibratory piling rig	1	10	88	

12.2 Prediction of Construction Noise Effects

The radius from works which construction noise levels will reduce to 70, 65 and 55 dB(A) has been predicted for each construction activity. These are the thresholds for SOAEL, derived from the BS5228-1[1] ABC method, for receptors situated in locations where prevailing ambient noise levels falls within Category A and B during the daytime, and Category C during the night-time. These are the categories relevant to noise sensitive receptors in proximity to the Scheme. This approach is consistent with the guidance set out in DMRB LA111[2]. The results of these predictions are provided in Table 12-9. The predictions assume no shielding from barriers or intervening structures, landforms, buildings etc.

Table 12-10 Representative receptors where there is a significant adverse effect from works

	Distance (m) at which noise level falls below SOAEL thresholds (free-field)		
Construction Activities	**Daytime Category A: $L_{Aeq,T}$ 65 dB**	**Daytime Category B: $L_{Aeq,T}$ 70 dB**	**Night Category C: $L_{Aeq,T}$ 55 dB**
Far-east compound establishment			
Site clearance	224	126	708
Fencing	13	7	40
Main compound establishment			
Site clearance	224	126	708
Fencing	13	7	40
Site laydown compound establishment			
Site clearance	224	126	708
Fencing	13	7	40
Demolition works			
Demolition of buildings	126	71	398
Demolition of houses	126	71	398

[1] BSI, 2009, amended 2014. British Standard (BS) 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
[2] UK Highways Agency, 2020. Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration. Sustainability & Environmental Appraisal. Noise and Vibration Rev 2

Construction Activities	***Distance (m) at which noise level falls below SOAEL thresholds (free-field)***		
	Daytime Category A: $L_{Aeq,T}$ 65 dB	**Daytime Category B: $L_{Aeq,T}$ 70 dB**	**Night Category C: $L_{Aeq,T}$ 55 dB**
Demolition of old pumping station	126	71	398
Demolition of concrete plinth	126	71	398
Demolition of River Dee Bridge	126	71	398
Demolition of gantry	126	71	398
Construction of carriageways (including tie-in)			
Site clearance	178	100	562
Drainage	50	28	158
Earthworks	71	40	224
River Dee Bridge in river works & abutments	89	50	282
River Dee Bridge	89	50	282
Pavement foundation construction	35	20	112
Pavement	141	79	447
Signs and lines	35	20	112
VRS and lighting	35	20	112
Installation of new River Dee Bridge			
Install new River Dee Bridge & Abutments	112	63	355
Accommodation works to Riverside Way			
Earthworks	50	28	158
Pavement foundation construction	50	28	158
Pavement	126	71	398
Construction of cycleways			
Site clearance	178	100	562
Earthworks	50	28	158
Cycleway foundation construction	45	25	141
Cycleway construction	112	63	355

Construction Activities	***Distance (m) at which noise level falls below SOAEL thresholds (free-field)***		
	Daytime Category A: $L_{Aeq,T}$ 65 dB	**Daytime Category B: $L_{Aeq,T}$ 70 dB**	**Night Category C: $L_{Aeq,T}$ 55 dB**
Signs and lines	40	22	126
Miscellaneous directional drilling activities			
Utilities installation	100	56	316
Installation and removal of temporary jetty's	71	40	224
Construction of pumping station			
Temporary works	71	40	224
Reinforced concrete boxes	28	16	89
Backfill	71	40	224

12.3 Detailed results of construction noise assessment

12.3.1 Construction noise levels have been predicted for each construction activity at representative noise sensitive receptors (NSR's). This level has been compared against SOAEL for construction noise defined in Volume 1 Chapter 12 of the ES, for the relevant baseline noise threshold defined in Volume 1 Chapter 12 of the ES. The duration of the construction activity has been considered, and where this is likely to be 10 or more days or nights in any 15 consecutive days or nights; or more than 40 days in any 6 consecutive months, a significant adverse effect is identified. The outcome of this assessment is presented for each representative NSR in Tables 12-10. to Table 12-15.

12.3.2 Where there is a high baseline noise level equal to or greater than SOAEL, the total noise from baseline and construction combined must result in an increase of at least 3 dB above the existing baseline for there to be the potential for a significant adverse effect. This has occurred for some receptor locations during the night-time period when SOAEL is relatively low. Where this has influenced the assessment of significant effect this is indicated in the results table with "*".

Table 12-11 Assessment of construction noise for Riverside properties, Claremont Avenue, Garden City (represented by LT-1†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	57	170	No	No	n/a
Fencing	32	170	No	No	n/a
Main compound establishment					
Site clearance	58	280	No	No	n/a
Fencing	33	280	No	No	n/a
Site laydown compound establishment					
Site clearance	51	625	No	No	n/a
Fencing	26	625	No	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Demolition works					
Demolition of buildings	55	215	Yes	No	n/a
Demolition of houses	44	790	Yes	No	n/a
Demolition of old pumping station	56	190	Yes	No	n/a
Demolition of concrete plinth	47	550	No	No	n/a
Demolition of River Dee Bridge	71	65	Yes	Yes	n/a
Demolition of gantry	76	35	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	67	145	Yes	Yes	n/a
Drainage	56	145	Yes	No	n/a
Earthworks	59	145	Yes	No	n/a
River Dee Bridge in River Works & Abutments	61	145	Yes	No	n/a
River Dee Bridge	61	145	Yes	No	n/a
Pavement Foundation Construction	53	145	Yes	No	No
Pavement	65	145	Yes	No	Yes
Signs & Lines	53	145	Yes	No	No
VRS and Lighting	53	145	Yes	No	No
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	66	100	Yes	Yes	n/a
Accommodation works to Riverside Way					
Earthworks	46	240	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Pavement Foundation Construction	46	240	Yes	No	n/a
Pavement	54	240	Yes	No	n/a
Construction of cycleways					
Site Clearance	90	10	Yes	Yes	n/a
Earthworks	79	10	Yes	Yes	n/a
Cycleway Foundation Construction	78	10	Yes	Yes	n/a
Cycleway Construction	86	10	Yes	Yes	n/a
Signs & Lines	77	10	Yes	Yes	n/a
Miscellaneous directional drilling activities					
Utilities Installation	85	10	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	66	60	Yes	Yes	n/a
Construction of Pumping Station					
Temporary Works	50	220	Yes	No	n/a
Reinforced Concrete Boxes	42	220	Yes	No	n/a
Backfill	50	220	Yes	No	n/a

† LT1 receptors have SOAEL levels of 65 dB(A) (Category A) during the daytime and 55 dB(A) (Category C) during the night-time period

In the case of LT1, the nearest noise sensitive receptors are closer to the construction works than the position of the LT1 measurement. Therefore, the distance given in the Table 12-11 is the distance from the works to nearest receptor represented by LT1.

Table 12-12 Assessment of construction noise for residences at Dundas Street and Queens Street, Queensferry (represented by LT-2†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	55	675	No	No	n/a
Fencing	30	675	No	No	n/a
Main compound establishment					
Site clearance	61	355	No	No	n/a
Fencing	36	355	No	No	n/a
Site laydown compound establishment					
Site clearance	74	45	No	No	n/a
Fencing	49	45	No	No	n/a
Demolition works					
Demolition of buildings	55	380	Yes	No	n/a
Demolition of houses	62	180	Yes	No	n/a
Demolition of old pumping station	49	440	Yes	No	n/a
Demolition of concrete plinth	71	60	No	No	n/a
Demolition of River Dee Bridge	48	480	Yes	No	n/a
Demolition of gantry	46	645	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	69	60	Yes	No	n/a
Drainage	58	60	Yes	No	n/a
Earthworks	61	60	Yes	No	n/a
River Dee Bridge in River Works & Abutments	63	60	Yes	No	n/a
River Dee Bridge	63	60	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Pavement Foundation Construction	55	60	Yes	No	Yes
Pavement	67	60	Yes	No	Yes
Signs & Lines	55	60	Yes	No	Yes
VRS and Lighting	55	60	Yes	No	Yes
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	47	495	Yes	No	n/a
Accommodation works to Riverside Way					
Earthworks	43	340	Yes	No	n/a
Pavement Foundation Construction	43	340	Yes	No	n/a
Pavement	51	340	Yes	No	n/a
Construction of cycleways					
Site Clearance	81	30	Yes	Yes	n/a
Earthworks	70	30	Yes	No	n/a
Cycleway Foundation Construction	69	30	Yes	No	n/a
Cycleway Construction	77	30	Yes	Yes	n/a
Signs & Lines	68	30	Yes	No	n/a
Miscellaneous directional drilling activities					
Utilities Installation	91	5	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	41	600	Yes	No	n/a
Construction of Pumping Station					
Temporary Works	46	365	Yes	No	n/a
Reinforced Concrete Boxes	38	365	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Backfill	46	365	Yes	No	n/a

† LT-2 receptors have SOAEL levels of 70 dB(A) (Category B) during the daytime and 55 dB(A) (Category C) during the night-time period

Table 12-13 Assessment of construction noise for residences at the western extent of Queens Street, Queensferry (represented by ST-1†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	53	925	No	No	n/a
Fencing	28	925	No	No	n/a
Main compound establishment					
Site clearance	51	605	No	No	n/a
Fencing	26	605	No	No	n/a
Site laydown compound establishment					
Site clearance	62	100	No	No	n/a
Fencing	37	100	No	No	n/a
Demolition works					
Demolition of buildings	51	630	Yes	No	n/a
Demolition of houses	67	98	Yes	Yes	n/a
Demolition of old pumping station	45	690	Yes	No	n/a
Demolition of concrete plinth	57	308	No	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Demolition of River Dee Bridge	45	730	Yes	No	n/a
Demolition of gantry	43	880	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	55	305	Yes	No	n/a
Drainage	44	305	Yes	No	n/a
Earthworks	47	305	Yes	No	n/a
River Dee Bridge in River Works & Abutments	49	305	Yes	No	n/a
River Dee Bridge	49	305	Yes	No	n/a
Pavement Foundation Construction	41	305	Yes	No	No
Pavement	53	305	Yes	No	No
Signs & Lines	41	305	Yes	No	No
VRS and Lighting	41	305	Yes	No	No
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	44	745	Yes	No	n/a
Accommodation works to Riverside Way					
Earthworks	39	585	Yes	No	n/a
Pavement Foundation Construction	39	585	Yes	No	n/a
Pavement	47	585	Yes	No	n/a
Construction of cycleways					
Site Clearance	73	75	Yes	Yes	n/a
Earthworks	62	75	Yes	No	n/a
Cycleway Foundation Construction	61	75	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Cycleway Construction	69	75	Yes	Yes	n/a
Signs & Lines	60	75	Yes	No	n/a
Miscellaneous directional drilling activities					
Utilities Installation	85	10	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	38	850	Yes	No	n/a
Construction of Pumping Station					
Temporary Works	41	610	Yes	No	n/a
Reinforced Concrete Boxes	33	610	Yes	No	n/a
Backfill	41	610	Yes	No	n/a

† ST-1 receptors have SOAEL levels of 65 dB(A) (Category A) during the daytime and 55 dB(A) (Category C) during the night-time period

Table 12-14 Assessment of construction noise for travellers' site off Riverside Way, Queensferry (represented by ST-2†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	63	275	No	No	n/a
Fencing	38	275	No	No	n/a
Main compound establishment					
Site clearance	73	90	No	No	n/a
Fencing	48	90	No	No	n/a
Site laydown compound establishment					
Site clearance	60	410	No	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Fencing	35	410	No	No	n/a
Demolition works					
Demolition of buildings	79	25	Yes	Yes	n/a
Demolition of houses	52	570	Yes	No	n/a
Demolition of old pumping station	75	40	Yes	Yes	n/a
Demolition of concrete plinth	56	338	No	No	n/a
Demolition of River Dee Bridge	67	100	Yes	No	n/a
Demolition of gantry	59	250	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	90	10	Yes	Yes	n/a
Drainage	79	10	Yes	Yes	n/a
Earthworks	82	10	Yes	Yes	n/a
River Dee Bridge in River Works & Abutments	84	10	Yes	Yes	n/a
River Dee Bridge	84	10	Yes	Yes	n/a
Pavement Foundation Construction	76	10	Yes	Yes	Yes
Pavement	88	10	Yes	Yes	Yes
Signs & Lines	76	10	Yes	Yes	Yes
VRS and Lighting	76	10	Yes	Yes	Yes
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	66	100	Yes	No	n/a
Accommodation works to Riverside Way					
Earthworks	85	5	Yes	Yes	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Pavement Foundation Construction	85	5	Yes	Yes	n/a
Pavement	93	5	Yes	Yes	n/a
Construction of cycleways					
Site Clearance	90	10	Yes	Yes	n/a
Earthworks	79	10	Yes	Yes	n/a
Cycleway Foundation Construction	78	10	Yes	Yes	n/a
Cycleway Construction	86	10	Yes	Yes	n/a
Signs & Lines	77	10	Yes	Yes	n/a
Miscellaneous directional drilling activities					
Utilities Installation	82	15	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	59	150	Yes	No	n/a
Construction of Pumping Station					
Temporary Works	79	15	Yes	Yes	n/a
Reinforced Concrete Boxes	71	15	Yes	Yes	n/a
Backfill	79	15	Yes	Yes	n/a

† ST-2 receptors have SOAEL levels of 70 dB(A) (Category B) during the daytime and 55 dB(A) (Category C) during the night-time period

Table 12-15 Assessment of construction noise for Claremont Avenue area, Garden City (represented by ST-3†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	62	105	No	No	n/a
Fencing	37	105	No	No	n/a
Main compound establishment					
Site clearance	50	420	No	No	n/a
Fencing	25	420	No	No	n/a
Site laydown compound establishment					
Site clearance	49	835	No	No	n/a
Fencing	24	835	No	No	n/a
Demolition works					
Demolition of buildings	50	420	Yes	No	n/a
Demolition of houses	42	1000	Yes	No	n/a
Demolition of old pumping station	51	345	Yes	No	n/a
Demolition of concrete plinth	44	760	No	No	n/a
Demolition of River Dee Bridge	61	200	Yes	No	n/a
Demolition of gantry	63	160	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	74	35	Yes	Yes	n/a
Drainage	63	35	Yes	No	n/a
Earthworks	66	35	Yes	Yes	n/a
River Dee Bridge in River Works & Abutments	53	200	Yes	No	n/a
River Dee Bridge	53	200	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Pavement Foundation Construction	60	35	Yes	No	Yes
Pavement	72	35	Yes	Yes	Yes
Signs & Lines	60	35	Yes	No	Yes
VRS and Lighting	60	35	Yes	No	Yes
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	60	200	Yes	No	n/a
Accommodation works to Riverside Way					
Earthworks	42	400	Yes	No	n/a
Pavement Foundation Construction	42	400	Yes	No	n/a
Pavement	50	400	Yes	No	n/a
Construction of cycleways					
Site Clearance	71	90	Yes	Yes	n/a
Earthworks	60	90	Yes	No	n/a
Cycleway Foundation Construction	59	90	Yes	No	n/a
Cycleway Construction	67	90	Yes	Yes	n/a
Signs & Lines	58	90	Yes	No	n/a
Miscellaneous directional drilling activities					
Utilities Installation	85	10	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	51	210	Yes	No	n/a
Construction of Pumping Station					
Temporary Works	45	405	Yes	No	n/a
Reinforced Concrete Boxes	37	405	Yes	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Backfill	45	405	Yes	No	n/a

† ST-3 receptors have SOAEL levels of 65 dB(A) (Category A) during the daytime and 55 dB(A) (Category C) during the night-time period

Table 12-16 Assessment of construction noise for Claremont Avenue area, Garden City (represented by ST-4†)

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Far-east compound establishment					
Site clearance	48	870	No	No	n/a
Fencing	23	870	No	No	n/a
Main compound establishment					
Site clearance	57	540	No	No	n/a
Fencing	32	540	No	No	n/a
Site laydown compound establishment					
Site clearance	82	33	No	No	n/a
Fencing	57	33	No	No	n/a
Demolition works					
Demolition of buildings	51	600	Yes	No	n/a
Demolition of houses	78	30	Yes	Yes	n/a
Demolition of old pumping station	51	645	Yes	No	n/a
Demolition of concrete plinth	58	280	No	No	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Demolition of River Dee Bridge	45	710	Yes	No	n/a
Demolition of gantry	43	850	No	No	No
Construction of carriageways (including tie-in)					
Site clearance	61	285	Yes	No	n/a
Drainage	50	285	Yes	No	n/a
Earthworks	53	285	Yes	No	n/a
River Dee Bridge in River Works & Abutments	55	285	Yes	No	n/a
River Dee Bridge	55	285	Yes	No	n/a
Pavement Foundation Construction	47	285	Yes	No	No
Pavement	59	285	Yes	No	Yes
Signs & Lines	47	285	Yes	No	No
VRS and Lighting	47	285	Yes	No	No
Installation of new River Dee Bridge					
Install new River Dee Bridge & Abutments	44	710	Yes	No	n/a
Accommodation works to Riverside Way					
Earthworks	44	575	Yes	No	n/a
Pavement Foundation Construction	44	575	Yes	No	n/a
Pavement	52	575	Yes	No	n/a
Construction of cycleways					
Site Clearance	90	10	Yes	Yes	n/a
Earthworks	79	10	Yes	Yes	n/a
Cycleway Foundation Construction	78	10	Yes	Yes	n/a

Activities	Predicted construction noise level free-field, $L_{Aeq,T}$ (dB)	Distance of receptor to works (m)	Works exceeds 10 days out of 15 consecutive (yes/no)	Significant adverse effect (yes/no)	
				Day	Night
Cycleway Construction	86	10	Yes	Yes	n/a
Signs & Lines	77	10	Yes	Yes	n/a
Miscellaneous directional drilling activities					
Utilities Installation	82	15	Yes	Yes	n/a
Construction of Temporary Jetty's					
Temporary jetty's	39	820	Yes	No	n/a
Construction of Pumping Station					
Temporary Works	47	570	Yes	No	n/a
Reinforced Concrete Boxes	39	570	Yes	No	n/a
Backfill	47	570	Yes	No	n/a

† ST-4 receptors have SOAEL levels of 65 dB(A) (Category A) during the daytime and 55 dB(A) (Category C) during the night-time period

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 12: Noise and Vibration Appendix C: Queensferry Pumping Station Operational Noise Impact Assessment

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12. Queensferry Pumping Station Operational Noise Impact Assessment

12.1 Introduction

12.1.1 Mott MacDonald has been commissioned to conduct a noise impact assessment relating to noise from a proposed pumping station located in Queensferry, Deeside.

12.1.2 Flintshire County Council Environmental Health department have requested that a noise impact assessment is undertaken in accordance with BS 4142:2014+A1:2019 as the proposed location of the development is adjacent to an existing Gypsy and Travellers site.

Study area and location

12.1.3 Due to the A494 River Dee Bridge Improvement Scheme, which will introduce a new river crossing south of the existing A494 Dee Bridge, the existing pumping station is required to be relocated. The proposed location for the new pumping station, shown in Figure 12-1 below, is adjacent to the existing Riverside Gypsy and Travellers Site. Pitches at the Gypsy and Travellers site are the nearest noise sensitive receptors to the development, the closest of which are about 63 metres away.

12.1.4 The site is situated in an industrial area of Queensferry and is adjacent to the River Dee and A494. The dominant noise source in this area is road traffic noise from the A494.

Figure 12-1 Proposed development location

Source: © OpenStreetMap Contributors + Mott MacDonald mark-up

Description and operation of proposed development

12.1.5 The new pumping station follows an open layout unlike the existing pumping station which is located within a pumphouse building. The new design consists of a new main river culvert connected to a wet well positioned behind a weir, as shown in Figure 12-2. Three submersible pumps are positioned almost 5m below ground level at the end of the wet well which discharge into a discharge chamber which joins back to the main culvert to control the river culvert level. The main culvert, wet well and discharge chamber are open to the atmosphere, guarded by railings, whereas the pumps are designed to be covered and are hidden under a removable concrete slab.

Figure 12-2 Layout of the proposed development

Source: Mott MacDonald – (drawing ref: 395318-MMD-ZZ-XX-DR-M-0001)

12.1.6 The submersible pumps are understood to run based on a minimum depth being exceeded in the wet well area and only when they are submerged in water. This effectively reduces the noise being emitted from the pump motors and mechanism itself. Each of the pumps are housed within a pipe which allows for water to be discharged via the pipe and into the discharge culvert. The pumps are designed to operate at a flow rate of 933 litres per second (0.933 cumecs) each. During storm events, one pump is anticipated to be required to operate but during extreme cases, two or even three pumps can run simultaneously. The wet well is understood to fill up during high tide, tide locked conditions which force water levels in the main culvert to rise above a certain height. This is anticipated to occur for over half the number of days in a year and it is expected that the additional pumps may run only in more extreme cases such as when there is extreme rainfall during the high tide.

12.1.7 The site also consists of a small motor control centre (MCC) kiosk and an emergency diesel generator as shown in Figure 6-2. The MCC kiosk contains no welfare facilities and is a small space which regulates and controls the pumping station operation. The kiosk is powered by an uninterruptible power source. Pumping operation, however, is powered by a separate mains electricity power

source which can depend on the emergency generator for power in the event of power loss and requirement for pump operation.

12.1.8 As the pumping station is not designed to be contained in a pump house, it is proposed that a permanent solid cover made of heavy-duty galvanised steel spanning the entire discharge chamber shall be provided to comply with a minimum sound insulation performance of R_w 34 dB[1]. The cover shall be fitted with individual access covers sufficiently sized for regular maintenance as required within the discharge chamber, three 750 x 750mm access covers shall be provided as a minimum. Access covers shall incorporate fall protection measures and odour seals.

12.2 Legislation and Policy Framework

Planning Policy Wales 12th Edition

12.2.1 Planning Policy Wales (PPW)[2] was last updated in July 2024 and is currently in its 12th edition.

12.2.2 Paragraph 6.7.5 states that the *"key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes.*"

12.2.3 Paragraph 6.7.6 states that when "*proposing a new development, planning authorities and developers must, therefore:*

i) address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;

ii) not create areas of poor air quality or inappropriate soundscape; and

[1] R_w is the overall weighted sound reduction index which characterises the airborne sound insulating properties of a building material or building element over a range of frequencies.
[2] Welsh Government, Planning Policy Wales, Edition 12, 2024

iii) seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes."

12.2.4 Furthermore, Paragraph 6.7.14 states that the "*Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur.*"

TAN 11

12.2.5 PPW is supplemented by a series of Technical Advice Notes (TANs). TAN 11: Noise[3] "provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business." TAN 11 predominantly outlines how local planning authorities should establish local policies and development plans and how to give conditions to planning permissions relating to noise.

12.2.6 The following is stated regarding noise generating development:

"Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance."

Local Planning Policy

12.2.7 Flintshire County Council (FCC) adopted the Local Development Plan (LDP) for the County on 24 January 2023. The LDP covers 2015 to 2030, and is used as the basis to make decisions on planning applications and development proposals. The LDP includes the following policies relevant to Noise and Vibration which have informed the assessment:

"***STR14: Climate Change and Environmental Protection***

The Council will seek to mitigate the effects of climate change and ensure appropriate environmental protection in the County through:

[3] Welsh Government, Planning Guidance (Wales), Technical Advice Note11: Noise, 1997

vi. ensuring that new development has regard to the protection of the environment in terms of … noise…"

*'**PC2: General Requirements for Development***

All development should:

b. not have a significant adverse impact on the safety and living conditions of nearby residents, other users of nearby land/property, or the community in general, through increased activity, disturbance, noise, dust, vibration, hazard, or the adverse effects of pollution"

*"**PC3: Design***

All development should:

h. protect the living conditions of nearby occupiers from any harmful effects of new development including overlooking, harm to outlook, increased activity/disturbance/noise.

*"**EN18: Pollution and Nuisance***

New development which would create an increased risk of noise, vibration, odour, dust, light or other pollution or hazard will only be permitted if:

a. it would not unacceptably harm general amenity or living conditions; and

b. it would not impose significant restrictions on the use or development of surrounding land."

Consultation with Local Authority

12.2.8 The Environmental Health Officer (EHO) for Flintshire County Council was approached prior to the assessment and the following reply is noted:

"For an application such as this my advice to Planning would be that because of the proximity of the travellers site to the new location I would require an acoustic consultant to carry out an assessment using BS 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound". This standard is designed

to take account of tonal, impulsive or hums etc. that may be present. From this they will be able to advise you of any necessary measures that will be required to protect the amenity of the travellers site."

12.2.9 In a subsequent email sent to the EHO on 30th April 2021, the proposed infrequent use of the emergency generator (located next to the MCC Kiosk) was discussed and it was determined that it "*would not have a material effect on the overall noise levels and should be excluded from the assessment.*"

British Standard 4142

12.2.10 BS4142:2014+A1:2019 entitled '*Methods for rating and assessing industrial and commercial sound*'[4] provides guidance for assessing a new industrial sound source in mixed residential and industrial areas. The methods described in this standard assess the likely effects of the new sound source on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

12.2.11 The level of sound from proposed new plant, the 'rating level', is predicted in terms of the A-weighted equivalent continuous sound level dB L_{Aeq}, and compared to the existing background sound level, in terms of L_{A90}. The L_{A90} is to be representative of the period being assessed. If the new sound source is impulsive, intermittent, or tonal in nature, then a penalty is added to the 'rating level' to account for the character of the noise.

12.2.12 The outcome of the assessment is defined in BS4142 with the following points that relate to the difference between the background sound level and the 'rating level':

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

[4] British Standards Institution, British Standard 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound", 2019

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

12.3 Measurements

Methodology

12.3.1 A baseline noise survey was undertaken in support of the wider noise impact assessment for the A494 Dee Bridge Scheme. The survey is reported in detail in Volume 3 Appendix 12A of the environmental statement for the Scheme. Measurements relevant to the assessment of the pumping station were those undertaken at “LT1” Claremont Avenue and “ST2” Riverside Way. The relevant details of the survey at these locations is provided below.

12.3.2 Noise surveys were completed between 16th December 2024 to 22nd December 2024 at location LT1 and ST2.

12.3.3 All measurements were undertaken by consultants competent in environmental noise monitoring and completed in accordance with the principles of BS 7445-1[5]. Descriptions of the site, noise climate and weather conditions were noted for each attended measurement. Photographs were taken of each position to allow ease of repeatability of the measurement.

12.3.4 All meters and field calibrators held current calibration certificates obtained under laboratory conditions traceable to UK and/or International Standards and were calibrated to meet the Class 1 specifications of IEC 61672-1[6]. Before and after each measurement session, the reference calibration level of each of the sound level meters used was checked using a field calibrator. Variations of no greater than 0.2 dB were noted over the measurement session for each of the meters.

[5] British Standards Institution, British Standard 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures, 2003.
[6] International Standard IEC 61672 Electroacoustics – Sound level meters – Part 1: Specifications. 2013.

12.3.5 An inventory of the equipment used for the surveys is shown in Table 12-1

Table 12-1 Noise Measurement Equipment Inventory

Item	Make and Model	Serial Number	Calibration Date
Calibrator 1	Rion NC75	34913593	21-Feb-2024
Sound Level Meter 1	Rion NL-52	754168	06-Feb-2024
Sound Level Meter 2	Rion NL-52	898308	06-Dec-2023

Source: Mott MacDonald

12.3.6 The relevant measurements were performed more than 3.5m away from any walls or vertical reflecting surface (i.e. the measurements were taken under free-field conditions). The microphones were supported using either a tripod or a fixed, metal pole at a height of 1.2 - 1.5m above the ground and fitted with a windshield suitable for outdoor use.

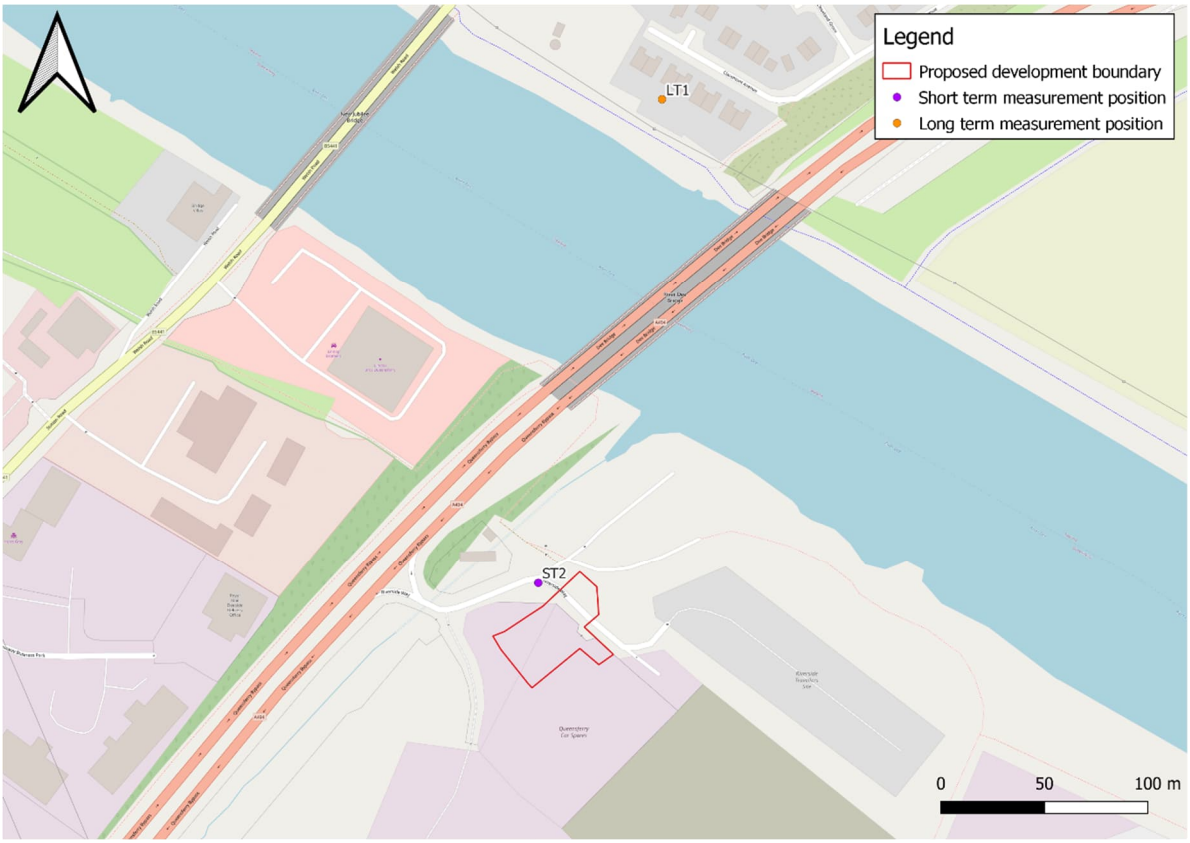
12.3.7 Details of the relevant measurement locations are provided in Table 12-2 and displayed in Figure 12-3 below.

Table 12-2 Noise Survey Locations

Measurement Location Reference	Location Description	BNG Reference	Measurement Duration
LT1	Rear Garden of 13 Claremont Avenue, Garden City	332373, 368685	1 week
ST2	Access Road to Gypsy and Travellers Site, Queensferry	332310, 368453	15min x2

Source: Mott MacDonald

Figure 12-3 Noise Measurement Locations in Relation to Proposed Pumping Station



Source: © OpenStreetMap Contributors + Mott MacDonald mark-up

Weather Conditions

12.3.8 Weather conditions were generally consistent during the period of measurement. During the long-term unattended measurements, the wind speeds were under 5m/s for the entirety of the measurement period. Data was captured using a portable meteorological station installed at LT1 measurement location. On some of the days, precipitation occurred. The data during these periods have been excluded from the analysis.

Measurement Results and Observations

12.3.9 For the purposes of this assessment, noise measurement data considered representative at or near the proposed pumping station is presented from the baseline noise survey conducted in December 2024. This concerns the data collected at locations LT1, at Claremont Avenue, and ST2, near the Gypsy and Travellers site entrance. The measurements taken at LT1 are considered to be the

most representative of the Gypsy and Travellers site at night due to the similar line of sight and relative proximity to the current A494 Dee Bridge. Photographs taken during measurement at these two locations can be seen in Appendix B.

Table 12-3 Long-term Noise Measurements at LT1, 13 Claremont Avenue

Date	$L_{Aeq,16h\ daytime}$ (dB)	$L_{Aeq,8h\ night\text{-}time}$ (dB)	$L_{A90,15min\ daytime}$ (dB)	$L_{A90,15min\ night\text{-}time}$ (dB)
Mon 16th Dec	58	53	55	41
Tue 17th Dec	60	56	58	43
Wed 18th Dec	59	52	56	41
Thu 19th Dec	55	53	54	40
Fri 20th Dec	59	52	58	43
Sat 21st Dec	58	52	56	47
Sun 22nd Dec	57	49	57	43

Source: Mott MacDonald

Table 12-4 Short-term Noise Measurements at ST2, Access Road to Gypsy and Travellers Site

Date	Start time	$L_{Aeq,15min}$ (dB)	$L_{A10,15min}$ (dB)	$L_{A90,15min}$ (dB)	$L_{Amax,15min}$ (dB)
Mon 16th Dec	11:05	66	67	63	81
Mon 16th Dec	13:07	67	68	64	75

Source: Mott MacDonald

12.3.10 Noise levels at the logger positions were dominated by traffic from the A494, and this is borne out by the closeness of the $L_{Aeq,15min}$ and $L_{A10,15min}$ data, as shown in Figure A.1. Noise levels measured at the short-term positions were also dominated by traffic noise from the A494.

12.4 Assessment and Discussion

Overview

12.4.1 This section sets out the BS4142 assessment of noise from the proposed pumping station in relation to the closest sensitive receptors. The assessment considers the proposed, design during the day and night-time periods.

Background Noise Level at Nearest Sensitive Receptors

12.4.2 As noted in Section 12.1.6, there is one group of sensitive noise receptors about 63m from the proposed development area which is the adjacent Gypsy and Travellers site. Noise measurements summarised in Section 12.3.9 are considered representative to establish a background noise level for the Gypsy and Travellers site. Measurements recorded at LT1, on the opposite side of the A494 Dee Bridge, are considered representative of the conditions at the Gypsy and Travellers site due to the similar proximity to the A494 and River Dee. The daytime short-term measurements of $L_{A90,15min}$ at position ST2 (near the Gypsy and Travellers site) are higher than the daytime L_{A90} measurements recorded at position LT1. This means that using the measurements at LT1 will provide a more conservative background sound level.

12.4.3 The modal $L_{A90,15min}$ values for the quietest day and night from the 7 days of measurement have been selected for use in assessment for respective daytime and night-time assessment periods. This is presented in Table 12-5 below.

Table 12-5 Representative Background Noise Level

Receptor description	Daytime $L_{A90,15min}$ (dB)	Night-time $L_{A90,15min}$ (dB)
Gypsy and Travellers Site (adjacent to Proposed Pumping Station)	54	40

Source: Mott MacDonald

BS4142 Prediction and Assessment

12.4.4 It is assumed that the dominant noise source from the proposed pumping station would emerge from the pumps discharging excess flow into the discharge culvert. Noise from the submersible pump motor and turbulence in the wet well/main channel is unlikely to be discernible at the receptors, when the pumps are discharging water into the discharge culvert. Therefore, the specific noise level is due to the pump discharge flow striking the outlet channel only.

12.4.5 Noise measurements to define this source could not be conducted at the existing pumping station due to its infrequent and unpredictable operation and enclosed location with a pumphouse. It was not practical to obtain noise measurements of falling water in controlled conditions analogous to the proposed installation either. In the absence of noise measurements for water falling into a channel, the specific noise level was predicted based on a research paper dataset which was used to derive an equation to predict sound pressure level in terms of pump flow rate and height of water falling. The full calculation method is reproduced in Appendix C.

12.4.6 The specific noise level accounts for the presence of the proposed access covers (with a minimum sound insulation performance of 34 dB R_w) and its noise attenuation effect. The noise from the pump discharge flow in the culvert, the construction of the discharge culvert, the dimensions and the material of the covers as well as the distance to the nearest sensitive receptors were used to predict the specific sound level. The predicted sound level of 9e dB at 1m from the source was used to derive a specific sound level of 23 dB at the receptor. The calculation process is described in Appendix C. It should be noted that this is the noise level for a single pump as a single pump is expected to be capable of discharging enough water even during storm events. Multiple pumps are required during very extreme cases and so the use of multiple pumps has not been assessed.

12.4.7 It is assumed that the pump discharge noise carries no tonal characteristics and produces no impulsive sounds. It is understood that the pumps will operate continuously until water returns to an acceptable depth and that they may run for a prolonged period when needed. As it is not known whether the water level

changes often during the assessed time periods, intermittency corrections have been applied to provide a conservative assessment. Therefore, a 3 dB penalty is applied to the specific sound level to attain the rating level.

12.4.8 The BS4142 assessment for the proposed pumping station design scenario is presented for day and night-time periods in Table 12-6 below.

Table 12-6 BS4142 Assessment Table for Daytime and Night-time Periods

	Day	Night	Commentary
Background sound level (dB $L_{A90,T}$)	54	40	Determined from long term measurements outlined in Section 12.3.9.
Predicted specific sound level (dB $L_{Aeq,T}$)	23	23	Predicted using research paper method, access cover and distance attenuation loss (Appendix C).
Acoustic feature correction (dB)	+3	+3	No tonal aspects to noise source or impulsivity but potential for presence of identifiable on/off conditions.
Rating level (dB $L_{Ar,Tr}$)	25	25	+3 dB correction applied.
Excess of rating over background sound level	-31	-17	
Initial estimate of impact	Low	Low	Rating level does not exceed the background level. This may be an indication of a low impact.

	Day	Night	Commentary
Assessment of impact, taking context into account	Unlikely that specific sound source will have an adverse or significant adverse impact		See Section 12.5.4 below.
Uncertainty of the assessment	Specific sound level is determined using research paper dataset in the absence of noise measurements. Most conservative noise background noise measurements have been considered from a representative measurement location.		

Source: Mott MacDonald

12.4.9 The above assessment provides an indication that an adverse impact from the proposed pumping station is not likely during the daytime and night-time periods, depending on context.

Consideration of Context

12.4.10 Guidance presented in BS4142 recommends the consideration of context of the specific noise source when performing an assessment which can modify the initial estimate of impact. In this instance, the proposed pumping station is required to cope with elevated river flow caused by tide-locked, high tide conditions. The pumps are expected to operate when water levels in the wet well reach a threshold level.

12.4.11 It is understood that elevated river flows due to tide locked, high tide conditions are likely to occur on more than half the number of days in a year. However, as the noise climate near the group of receptors is dominated by road traffic noise and the background levels are significantly higher than the rating level, it is unlikely that an adverse impact would arise from the proposed pumping station.

12.5 Conclusion

12.5.1 This report presents a noise impact assessment using BS4142 methodology of a proposed surface water pumping station located in Queensferry, Deeside.

12.5.2 Noise measurements were undertaken in December 2024 with one long-term and one short-term measurement position.

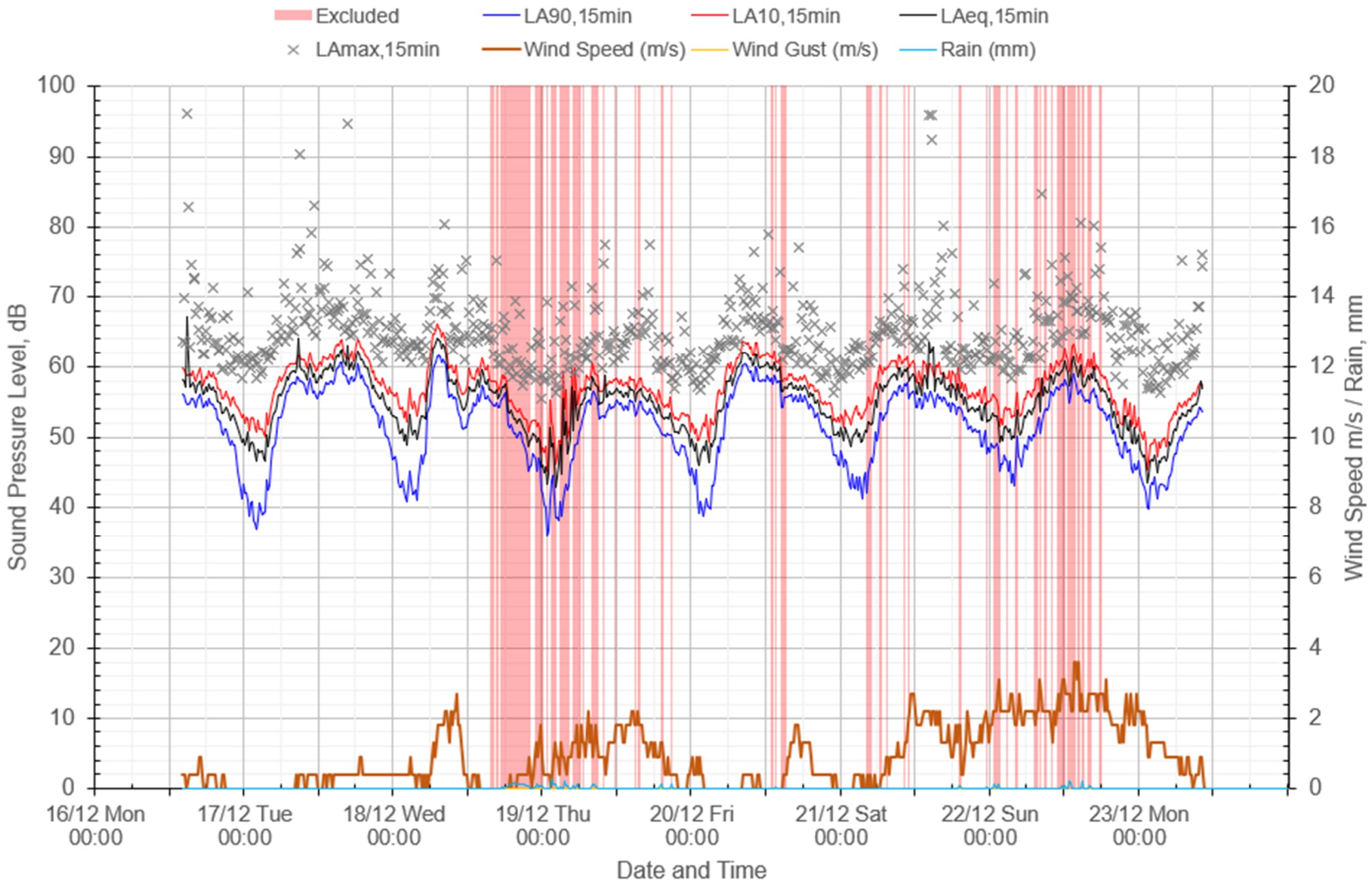
12.5.3 A specific sound level prediction was made based on a research paper dataset exploring water feature noise in the absence of noise measurement data at existing pumping stations. The prediction accounts for the presence of the proposed access covers (with a minimum sound insulation performance of 34 dB R_w) and its noise attenuation effect.

12.5.4 Assessment of the proposed design of the new pumping station in accordance with BS4142 determines an indication of a low noise impact during the daytime and night-time periods, depending on context.

12.5.5 When considering the context, it is considered unlikely that an adverse impact would be experienced by residents of the Gypsy and Travellers site during day or night-time periods due to the existing background level being significantly higher than the predicted rating level.

A. Noise Measurement Results

Figure A-1 Noise Measurement Results at LT1, 13 Claremont Avenue



B. Photographs of Relevant Noise Measurement Positions

Figure B-1 Long-term Measurement Position at LT1, 13 Claremont Avenue

Figure B-2 Short-term Measurement Position at ST2: Access Road to Gypsy and Travellers Site

C. Calculation of Specific Sound Level of Pump Discharge Flow

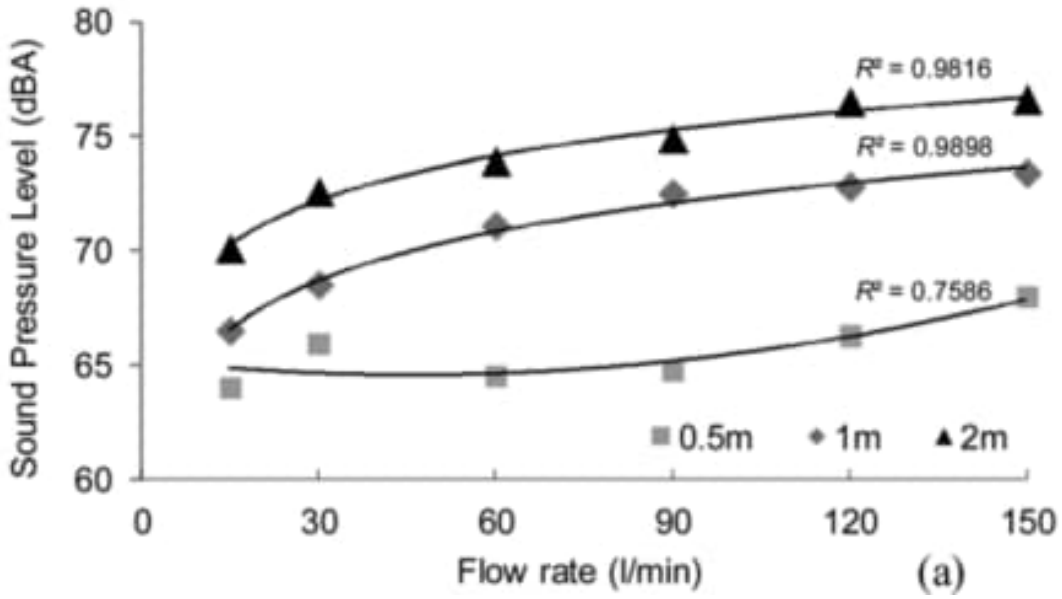
The dominant noise source emerging from the proposed pumping station is assumed to be from the water striking the discharge chamber after being passed through the pump outflow pipes. This noise level could not be measured in-situ as the proposed design has not been implemented and the existing design is different in operation, operates infrequently and is contained within a pumphouse.

Therefore, results from a 2013 research paper dataset exploring a similar water flow effect have been adopted to quantify this pump discharge noise source. The paper, “Acoustical and perceptual assessment of water sounds and their use over road traffic noise”[7] explores the physical and perceptual properties of water sounds generated by small to medium sized water features that have applications for road traffic noise masking. Water sounds were reproduced in the laboratory by varying design parameters such as fall height, flow rate and water feature design.

Analysis showed that estimations can be made on how these parameters affect sound pressure levels – the same parameters have been modified to emulate the context of the pumps used in the proposed pumping station to predict a specific sound level.

[7] Galbrun, L & Ali, TT 2013, 'Acoustical and perceptual assessment of water sounds and their use over road traffic noise', Journal of the Acoustical Society of America, vol. 133, no. 1, pp. 227-237. https://doi.org/10.1121/1.4770242

Figure C-1 Graph Showing Sound Pressure Level vs Flow Rate for a Plain Edge Waterfall with Varying Heights of Falling Water



Source: L. Galbrun and T. T. Ali: Water sounds and road traffic noise – Fig. 3.(a)

Using the data shown in Figure C.1: Graph Showing Sound Pressure Level vs. Flow Rate for a Plain Edge Waterfall with Varying Heights of Falling Water above, the regression lines for 1m and 2m heights were transformed to derive a linear estimate of sound pressure level (SPL) at 1m from the flow as a function of the drop height and the logarithmic value of pump flow rate. The equation is described below:

$$Sound\ Pressure\ Level = (7.49 - 0.55\ h)\log(flow) + 54.2 + 4.2\ h$$

where flow refers to the pump flow rate in terms of litres per minute and h refers to the fall height of water in metres.

For the case of the proposed pumping station, each pump is required to produce a flow of 933 litres per second or 56,340 litres per minute and the pump outlet is approximately 1.8m above the channel bed. Although the research paper focused on flow rates of up to a 150 litres per minute, this derived equation can be extrapolated and outputs a sound pressure level of 93 dBA at 1m. This value is considered to be a reasonable worst case noise level of rapid water flow striking the discharge culvert.

A BS4142 assessment requires noise levels to be evaluated at the receptor and so a distance and the proposed access cover attenuation loss correction is applied to this level of 93 dBA at 1m from the noise source. Summing the specific sound level at the source (for a single operating pump), the distance correction and the proposed access cover attenuation loss correction gives a specific sound level at the receptor equal to 22 dBA. The calculation method is described in Table C-1 below.

Table C-1 Breakdown of Specific Noise Level Attenuation Calculation

Method Step	Value	Commentary
Direct sound pressure level, SPL (dBA)	93	Predicted from research paper method.
Measurement distance from source (m)	1	
Directivity of noise source, Q	1	Assumed spherical propagation of noise.
Sound power level from discharge, SWL (dBA)	103	Predicted SWL from flow striking culvert channel.
Volume of culvert, V (m^3)	45.6	
Reverberation time, RT, of culvert volume (s)	2.1	Predicted based on construction type of culvert.
Reverberant sound pressure level in culvert (dBA)	103	Predicted based on SWL, V and RT parameters.
Overall sound pressure level, SPL, in culvert (dBA)	104	Predicted based on direct and reverberant SPL values.
Sound reduction index in R_w assumed (dB)	34	
Distance attenuation	36	Based on the distance of 63m between the pump and the nearest noise receptor.
Sound pressure level at receptor (dBA)	23	Predicted specific noise level from Room to Atmosphere calculation method from Sound Research Laboratories textbook[8].

[8] Fry. A, 1988. Noise Control in Building Services, Pergamon Press

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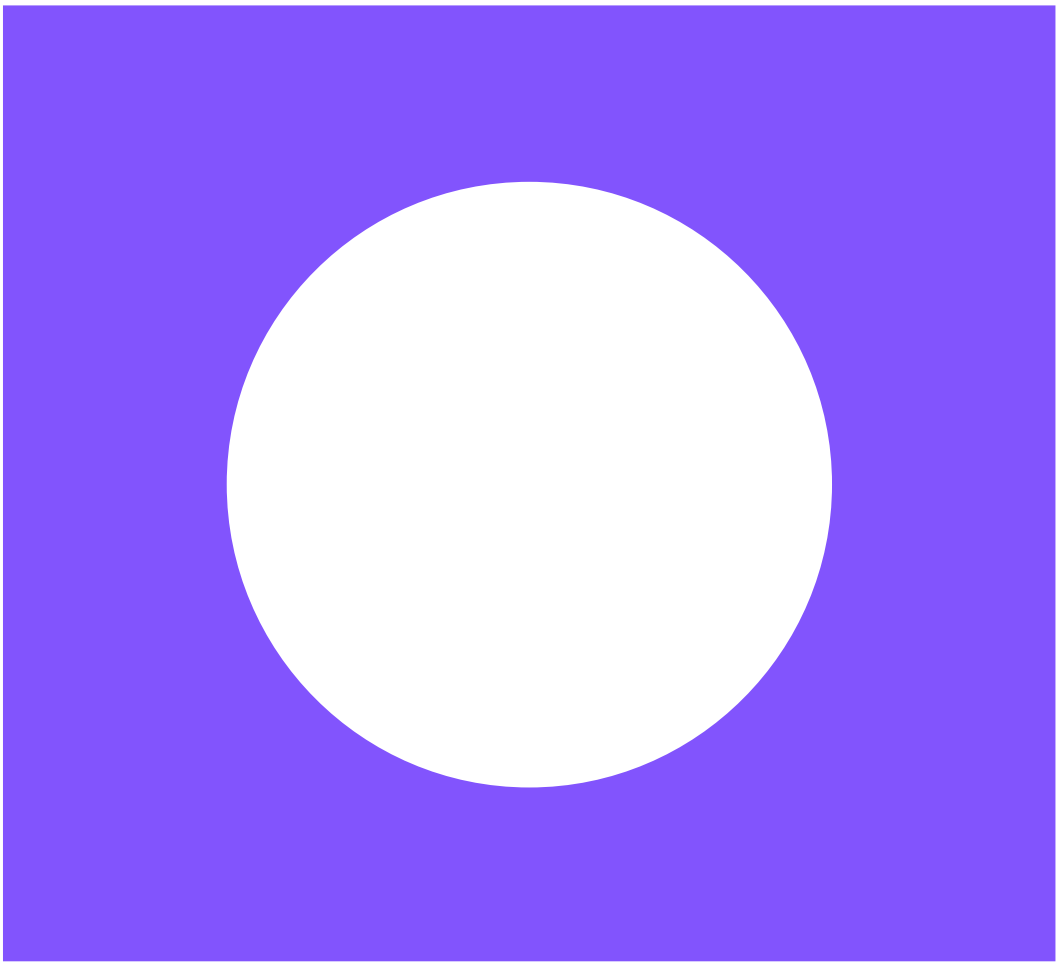

A494 River Dee Bridge Improvement

Intertidal Survey Report

September 2025

395318-RML-00-XX-RP-L-0014

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A494 River Dee Bridge Improvement

Intertidal Survey Report

September 2025

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Issue and Revision Record

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Contents

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Executive summary

The Welsh Government appointed Mott MacDonald to undertake an intertidal walkover survey to inform the A494 River Dee Bridge Replacement Scheme. Surveys were undertaken in March 2025 by suitably qualified marine ecologists from Mott MacDonald and covered three separate locations:

- The proposed Scheme location;
- The Airbus Load Out Facility (ALOF), identified as a site that could be utilised for enabling works; and
- An intertidal habitat enhancement site, located near Greenfield, Flintshire.

The aim of the survey was to characterise the intertidal habitats present, provide an informative assessment of the range of biotopes in the area, and identify any Features of Conservation Importance (FOCI) present.

The survey was conducted during the spring tide window, as close as practicable to the optimal date for the lowest tidal levels, known as ‘Mean Low Water Spring’ (MLWS). Access to small areas of the lower littoral zone were limited due to health and safety concerns relating to the presence of sinking sand/mud. However, this did not prevent the broad habitat type from being identified.

A high-level survey of the saltmarsh was undertaken, though given the timing of the survey was outside of the optimal saltmarsh survey window, many species would not yet be identifiable and as such, it is recommended that further surveys are undertaken between the 1st June and the 30th September, when saltmarsh species are in full bloom, and plants are most identifiable.

Overall, the proposed Scheme site was characterised by mud and sandy mud habitats consistent with an upper estuarine environment. Intertidal fauna was generally limited to barnacles. Flora was also limited to a few species which were all located on hard structures.

The ALOF site comprised a mosaic of muds and sands in varying proportions, with fauna predominantly confined to the hard structures (fenders, concrete and sheet piles) and limited to barnacles. A high proportion of microplastic debris was also identified along the shore.

For the Greenfield enhancement site, the saltmarsh was much larger in extent, featuring pools which supported sea slugs and marine isopod species. Rocky areas supported higher species abundance of characteristic brown algae species more typical of coastal environments, such as spiral and bladder wracks. The lower littoral comprised barren sand with the mid characterised by a mosaic of sandy mud and muddy sand, featuring limited fauna, such as the common cockle *Cerastoderma edule*.

1 List of Abbreviations

ALOF	Airbus Load Out Facility
FOCI	Features of Conservation Interest
JNCC	Joint Nature Conservation Committee
MLWS	Mean Low Water Spring
MHWS	Mean High Water Spring
NGR	National Grid Reference
NRW	Natural Resources Wales
SACFOR	Superabundant (S), Abundant (A), Common (C), Frequent (F), Occasional (O), Rare (R)
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TN	Technical Note

2 Introduction

2.1 Scheme background

The River Dee Bridge is a vital link for cross-border traffic between north Wales, the northwest of England, and beyond. It connects people, communities, and businesses, carrying approximately 68,400 vehicles each day.

The proposed Scheme comprises the construction of a new off-line single structure River Dee Bridge, with the same number of lanes as the existing A494 bridge. it is not practical to close the A494 to renew the existing bridge and so the proposal is to provide a new bridge structure to the southeast of the existing bridge and immediately upstream.

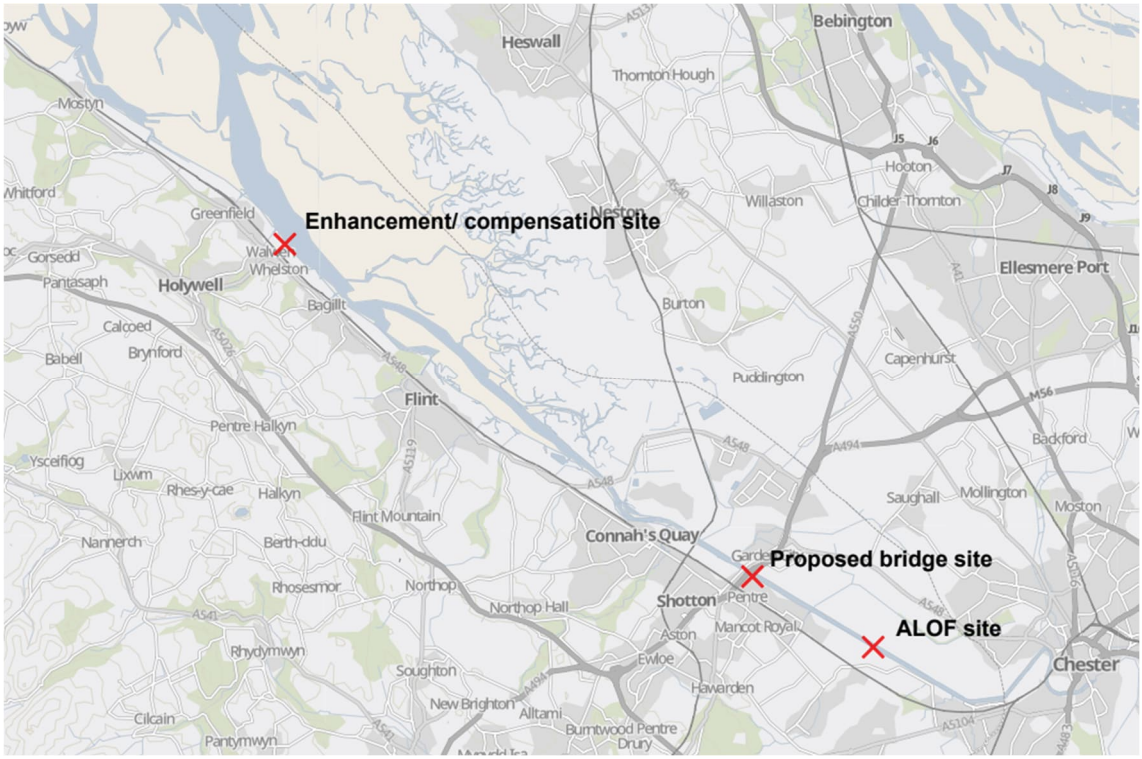
The proposed A494 River Dee Bridge Replacement Scheme (hereafter referred to as 'the Scheme') is required due to the poor structural condition of the existing bridge deck. Inspections and monitoring have shown that the frequency of repairs required is increasing each year, along with the risk of major interventions that would necessitate closing the Bridge. If no action is taken, the bridge will continue to deteriorate, potentially leading to further weight restrictions and lane closures in the short to medium term and, ultimately, resulting in closure in the medium to long term.

To enable construction works, the Airbus Load Out Facility (ALOF) used previously by Airbus, was considered for use to load construction materials onto a barge, to then be transported to the new bridge location[1]. A site has also been identified as a potential for enhancement at Greenfield, Holywell in Flintshire (National Grid Reference (NGR): SJ 2077 6924). As such, this report outlines results of the intertidal walkover survey undertaken for all three locations (outlined in Figure 2.1):

- The Scheme site;
- ALOF site; and
- Greenfield enhancement site.

[1] As of June 2025, the ALOF site is no longer going to be used as part of the Scheme.

Figure 2.1: Overview of the survey areas



Source: Contains OS data © Crown Copyright and database right 2025 Contains data from OS Zoomstack

2.2 Survey aim

The aim of the survey was to provide an informative assessment of the intertidal species and habitats present in the three areas outlined above and identify any Features of Conservation Importance (FOCI) present.

3 Methodology

3.1 Survey

Intertidal walkover surveys were undertaken over three days in March 2025 (dates provided in Table 3.1 below) by suitably qualified MML marine ecologists from Mott MacDonald, using the following best practice guidance:

- Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook[2];
- the JNCC Handbook for Phase 1 Habitat Survey, a Technique for Environmental Audit[3]; and,
- Modified Folk classification system[4].

Marine and intertidal habitat codes adopted from the Marine Habitat Classification for Britain and Ireland[5] are used to describe the biotopes observed during the survey, and the SACFOR[6] abundance scale utilised to record the cover/density of species identified[7]. The survey commenced two hours before the low tide with the lower littoral zone surveyed at the low tide (see Table 3.1 for details).

Table 3.1: Tide Times and Heights

Date	Location	Low tide time	Height above chart datum (m)
13/03/2025	A494 River Dee Bridge	9.18am	0m
24/03/2025	ALOF site	5:12pm	0m
25/03/2025	Greenfield, Flintshire	3.21pm	2.72m

Source: WillyWeather[8]

3.2 Limitations

The survey was conducted during the spring tide window in March 2025, as close to the optimal date for the lowest of low tides, known as Mean Low Water Spring (MLWS). Access to small areas of the lower littoral zone were limited due to health and safety concerns relating to the presence of sinking sand/mud. However, this did not prevent the broad habitat type from being identified.

[2] Davies et al., 2001. Marine Monitoring Handbook [Online] Available at: Marine Monitoring Handbook: Procedural Guidelines (PG 4-5. Using photographic identification techniques)

[3] JNCC, 2010. Handbook for Phase 1 habitat survey – a technique for environmental audit [Online] Available at: Handbook for Phase 1 habitat survey)

[4] Evans, D, 2017. Revising the marine section of the EUNIS Habitat Classification – Report of a workshop held at the European Topic Centre on Biological Diversity, May 2016 [online] Available at: Revising the marine section of the EUNIS Habitat classification - Report of a workshop held at the European Topic Centre on Biological Diversity, 12 & 13 May 2016 - ETC/BD Working paper N°A/2016 revised 2017 — Eionet Portal

[5] JNCC, 2010. Marine Habitat Classification for Britain and Ireland. [Online] Available at: JNCC Marine Habitat Classification

[6] Super-abundant, Abundant, Common, Frequent, Occasional, Rare, Present

[7] JNCC, 1990. SACFOR abundance scale used for both littoral and sublittoral taxa from 1990 onwards. [Online] Available at: sacfor.sacfor.pdf

[8] Willy Weather, ND [online] Available at: River Dee - Queensferry New Bridge Tide Times, Flintshire - WillyWeather

As the survey was carried out in spring, any seasonal variation will not have been documented, and the results should be viewed as a single snapshot in time which may not represent the change in species/habitats due to seasonal variations.

A high-level survey of the saltmarsh habitat was undertaken, though given this was outside of the optimal survey window, many species would not yet be in full bloom and therefore unidentifiable. As such, it is recommended that further surveys are undertaken between the 1st June and the 30th September, when saltmarsh growth is at its maximum and plants are easiest to identify[9].

It was not possible to survey the north side of the river opposite the ALOF structure within the tidal window given access/crossing points over the river. However, this did not prevent the broad habitat type from being identified from the lower littoral on the south side. The habitats appeared similar, there is the potential that some notable or invasive species (at low density) could have been under recorded or missed.

[9] NRW, 2023. Benthic Habitat Assessment Guidance – Characterising and monitoring saltmarsh (GN30e) Guidance note template, external

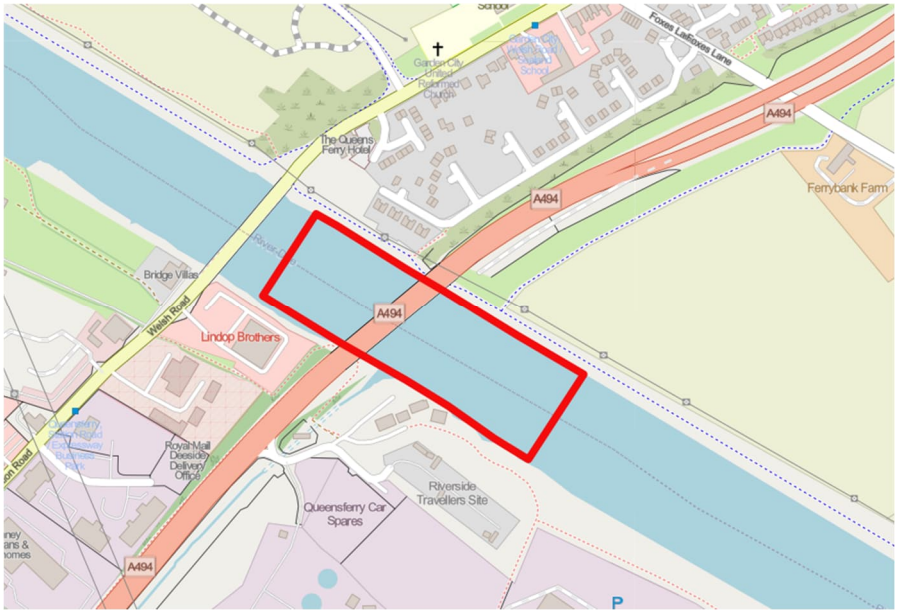
4 Results

The following sections describe the habitats identified during the walkover survey. Their locations are provided in the habitat map (Appendix A) and target notes (TNs) are provided in Appendix B.

4.1 Scheme location

The survey area of the proposed Scheme where the new bridge structure will be constructed is outlined below in Figure 4.1.

Figure 4.1: Survey area –Scheme location



Source: Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri

4.1.1 Southwest bank of the river (west abutment)

The upper littoral was backed by saltmarsh and scrub, though given the survey was not undertaken at the optimal time of year, species identification was limited and a repeat survey will likely be required between 1st July and 30th August, though has been assigned the biotope **saltmarsh LS.LMp.Sm)**. Scrub backing the saltmarsh predominantly comprised buddleia.

At the site, southeast of the Scheme, the Queensferry drain, which is a statutory Main River (Figure 4.2) (TN1) and a Dŵr Cymru Welsh Water outfall (Figure 4.3) flows into the River Dee. The latter featured rock revetment **(littoral rock; LR)** and was noted to have a foaming smelly discharge. Limited species were present however, green algae (occasional (O)) was noted on some of the rocks.

Substrate found within the main river from the mid to lower littoral comprised fine muddy sand with the channel itself comprising gravelly sediment, forming the biotope **littoral mixed sediment (LS.LMx)**.

Figure 4.2: Queensferry Drain

Source: Mott MacDonald, 2025

Figure 4.3: Outfall

Source: Mott MacDonald, 2025

Extending northwest and southeast of this, the substrate from the mid- to lower littoral comprised fine sandy mud with scattered rocks and debris, forming the biotope **Polychaete-/oligochaete-dominated upper estuarine mud shores (LS.LMu.UEst)**. Limited fauna was noted; the non-native, modest barnacle *Austrominius modestus* and rock barnacles *Semibalanus balanoides* (O) were present on rocks and debris throughout the mid- to lower littoral, though were mostly dead (Figure 4.4). A tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.) (R) was noted on rocks.

Wooden posts (likely remnants of a pontoon or similar) were also noted on the upper littoral to the southeast of the existing bridge structure (TN2).

Figure 4.4: Barnacles on rocks and debris

Figure 4.5: Overview of the scheme area facing northwest

Source: Mott MacDonald, 2025

Source: Mott MacDonald, 2025

Directly under the existing bridge structure, the upper littoral comprises **littoral mud (LS.LMu)** with Enteromorpha (O). This is separated from the mid-littoral by sheet piles (Figure 4.6), and lined on either side by small strips of **saltmarsh habitat (LS.LMp.Sm)**, likely due to the shading effect of the existing bridge (Figure 4.7). The lower littoral comprises muds with gravels and cobbles forming **littoral mixed sediment (LS.LMx)**. Below the surface of the water, filamentous brown seaweeds were present, confined to rocks.

Figure 4.6: Mid and upper littoral underneath the existing bridge (south side)

Source: Mott MacDonald, 2025

Figure 4.7: Upper littoral showing mud between saltmarsh under existing bridge

Source: Mott MacDonald, 2025

Downstream of the existing bridge, the upper littoral is backed **by saltmarsh habitat (LS.LMp.Sm)**, with the mid- to lower littoral comprising predominantly barren fine muddy sand, featuring ripples with a crumbly texture, forming the biotope **Polychaete/bivalve-dominated muddy sand shores (LS.LSa.MuSa)** (Figure 4.8).

Figure 4.8: Intertidal area southeast from the blue bridge

Source: Mott MacDonald, 2025

4.1.2 Northeast bank of the river (east abutment)

The littoral zone on the north side of the river is also backed by **saltmarsh habitat LS.LMp.Sm**, though dominated by sea purslane *Halimione portulacoides* (Figure 4.9) with English scurvygrass *Cochlearia anglica* (R). The upper to mid littoral comprises a mosaic of sandy mud (**littoral sandy mud; LS.LMu**) with tubular green seaweed (O) (likely *Blidingia* spp. or tubular *Ulva* spp.), with rocks and debris are scattered throughout the lower to mid littoral featuring a brown algal veneer (R) and green algae (O) (Figure 4.10).

At the lower littoral and just below the low tide, filamentous brown algae (C) are also present on rocks and debris (Figure 4.11). The non-native modest barnacle *Austrominius modestus* and rock barnacles *Semibalanus balanoides* (O) were also present on rocks and debris, though living specimens were confined to the lower littoral zone.

As for the south side of the river, saltmarsh is absent from the shaded area below the existing bridge structure (Figure 4.12). The area above the mean high water line appeared to comprise dried out mud/clay, with tubular green seaweed (O) (likely *Blidingia* spp. or tubular *Ulva* spp.) on the concrete backing the shore. Air holes/bubbles (though also may be a result of infaunal activity) were visible in the fine muddy sand substrate below the mean high water line.

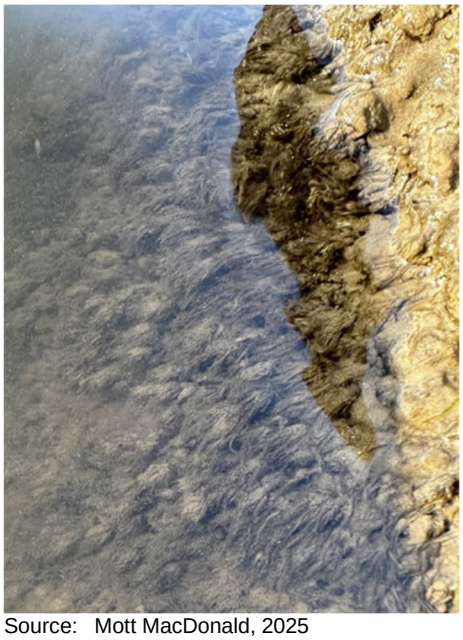
Figure 4.9: Sea purslane backing the intertidal area

Source: Mott MacDonald, 2025

Figure 4.10: Intertidal area facing northwest towards the existing bridge

Source: Mott MacDonald, 2025

Figure 4.11: Filamentous brown on rock just below the low tide



Source: Mott MacDonald, 2025

Figure 4.12: Intertidal area below the existing bridge structure

Source: Mott MacDonald, 2025

4.1.3 Existing bridge structure

The existing bridge structure features two concrete supports within the river, each featuring 9 pillars. Tubular green seaweed (C) (likely *Blidingia* spp. or tubular *Ulva* spp) was noted to be present on the concrete structure (Figure 4.13Figure 4.14). Brown algae (R) was also noted on the top of the concrete support and barnacles (likely *A. modestus* and S*. balanoides*) (O) were present on the pillars.

Figure 4.13: Tubular green and filamentous brown algae on north side of existing bridge structure

Mott MacDonald, 2025

Figure 4.14: South side of existing bridge structure

Source: Mott MacDonald, 2025

4.1.4 Additional observations

Incidental bird sightings were noted during the survey; these comprised the following:

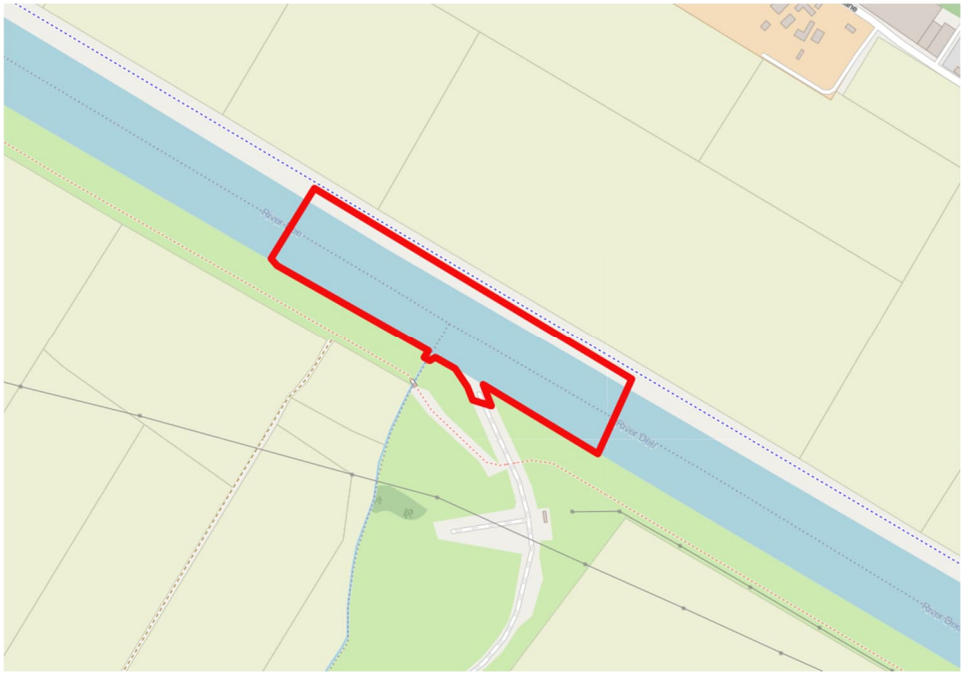
- Gull spp.
- Pied wagtail *Motacilla alba*;
- Little egret *Egretta garzetta*; and
- Redshank *Tringa totanus*.

Redshank were noted to be particularly sensitive of surveyors' presence on the foreshore, taking flight at a distance of at least 50m.

4.2 ALOF site

The survey area of the ALOF site is outlined below in Figure 4.15.

Figure 4.15: ALOF survey area



Source: Map data © OpenStreetMap contributors, Microsoft, Facebook, Google, Esri Community Maps contributors, Map layer by Esri

4.2.1 Upper littoral

The upper shore of the ALOF comprises mud and vegetation (likely saltmarsh spp.), overlying the concrete slipway (Figure 4.16). The survey was taken outside of the recommended season for saltmarsh habitat surveys, therefore a detailed saltmarsh survey to national vegetation classification (NVC) standard will need to be undertaken; however, records of saltmarsh surveys previously undertaken by Natural Resources Wales (NRW) from 1990 to 2003 (NRW)[10] indicate *Puccinellia maritima* saltmarsh community backed by mesotrophic grassland, *Festuca rubra–Agrostis stolonifera–Potentilla anserina* grassland. Species identified backing the upper littoral during the intertidal walkover survey comprise common scurvygrass *Cochlearia officinalis* (O) and common couch (A). On a precautionary basis, this area has been assigned the **saltmarsh habitat (LS.LMp.Sm)** biotope.

The recorded saltmarsh extends along the entirety of the south banks of the survey area. A stream flows out through the saltmarsh to the west of the ALOF (TN3), this is also a designated main river called Beeches Drain Dee. Substrate lining and within the main river comprised a mix of boulders, gravels and sediments, comprising **littoral mixed sediment (LS.LMx)**.

Generally, the upper littoral comprised sandy mud and muddy sand in varying proportions, with muds confined to sheltered areas of the ALOF, lining the sheet piles. The **littoral sandy mud biotope (LS.LMu)** has been assigned. Footprints (Appendix **Error! Reference source not found.**, TN4) were also noted on upper and mid-littoral, which are likely to be fox tracks.

The north side of the river comprises grassland/saltmarsh featuring drainage channels backing the upper littoral, as noted above, this will need a more detailed survey to be undertaken. This is lined by sandy mud **(littoral mud; LS.LMu)**. Though the north side was not accessed during this survey (see section 3.2), biotopes are anticipated to be appeared similar to those of the south side of the river, though featuring a higher proportion of rocks and steeper gradient.

[10] NRW Phase 2 Saltmarsh baseline survey (1990 - 2003) [online] Available at: New map | DataMapWales

Figure 4.16: Overview of the site

Source: Mott MacDonald, 2025

Figure 4.17: Upper to mid shore, facing west

Source: Mott MacDonald, 2025

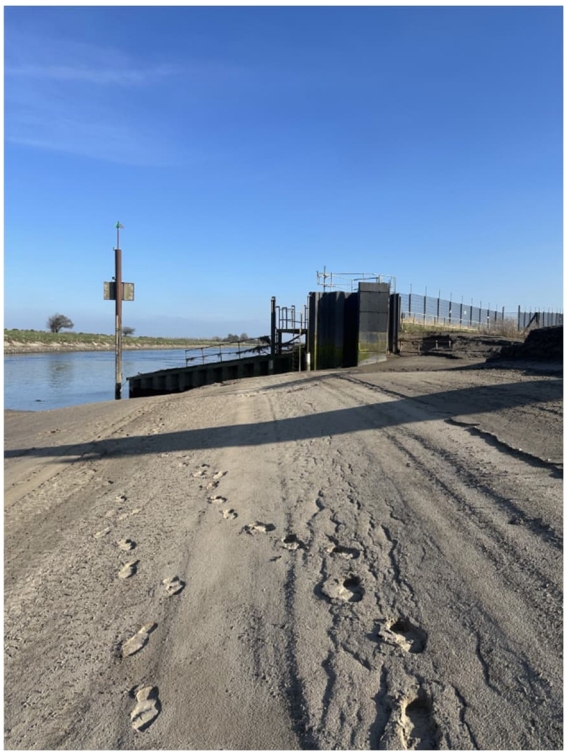
4.2.2 Mid littoral

The mid to lower littoral within the ALOF site comprised an area of fine muddy sand (Figure 4.17 and Figure 4.18), encompassed by steel sheet piled structures (Figure 4.19) lining both sides of the slipway. Ten donut fender monopiles line the west side of the ALOF, extending from the upper to lower littoral.

No species were identified within the sediment of the mid littoral, though the non-native modest barnacle *Austrominius modestus* and rock barnacles *Semibalanus balanoides* (O) were present on the sheet piles, concrete structures and the fenders. Green and filamentous brown algae were also noted on structures within the ALOF with brown algae also visible on rocks below the low water line. The mid-littoral therefore comprised fine muddy sand (**Littoral sand LS.LSa**), transitioning into sandy mud (**Littoral mud LS.LMu**). The north side of the river featured a higher proportion of rocks and was steeper in gradient therefore comprising **littoral mixed sediment (LS.LMx)**.

To the east and west of the ALOF structure, the mid-littoral zone also comprises muddy sand, with areas of rocks in varying proportions towards the lower littoral zone (Figure 4.20 and Figure 4.21). Remnants of what appears to be a wooden fence lines the mid- to lower littoral zone (TN5) to the east and west of the ALOF.

Figure 4.18: ALOF facing west

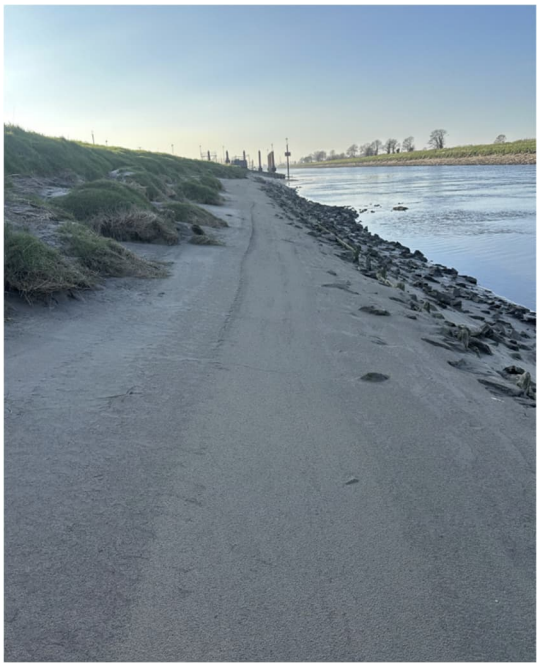


Source: Mott MacDonald, 2025

Figure 4.19: Sheet piles encompassing the ALOF

Source: Mott MacDonald, 2025

Figure 4.20: Area east of the ALOF site, facing west



Source: Mott MacDonald, 2025

Figure 4.21: Area east of the ALOF site, facing east

Source: Mott MacDonald, 2025

4.2.3 Lower littoral

The Baltic tellin *Macoma balthica* (O) and the peppery furrow shell *Scrobicularia plana* (R) were identified within the muddy sand substrate on the lower littoral, along with dog whelk *Nucella lapillus* (R) and blue mussel *Mytilus edulis* (R) casts, forming the biotope ***Hediste diversicolor*, *Macoma balthica* and *Scrobicularia plana* in littoral sandy mud (LS.LMu.MEst.HedMacScr)**. This biotope is anticipated to be present on the lower littoral of north side of the river also.

Below the low water level, the river was shallow with sandbanks visible and a metal structure extending out into the river (a rail/support of sorts) (TN6), forming part of the ALOF was noted.

The lower littoral of north side of the river comprised **littoral mixed sediment (LS.LMx)**, extending from the mid littoral (Figure 4.24).

Figure 4.22: Fenders extending to the lower littoral, facing northwest

Source: Mott MacDonald, 2025

Figure 4.23: Microplastics on the lower littoral

Source: Mott MacDonald, 2025

Figure 4.24: North side of the river

Source: Mott MacDonald, 2025

4.2.4 Additional observations

Incidental bird sightings were noted during the survey; these comprised the following:

- Redshank *Tringa totanus*;
- Cormorant *Phalacrocorax carbo*;
- Gull spp.;
- Oystercatcher *Haematopus ostralegus*; and
- Little egret *Egretta garzetta*.

Microplastic debris were observed along the shore (Figure 4.23: MicroplasticsFigure 4.23), extending from the lower littoral to the upper littoral. This may have originated from the plastic recycling facility or household recycling facility, located west of the survey area.

4.3 Enhancement/compensation site

The survey area of the enhancement/compensation site is outlined below in Figure 4.25.

Figure 4.25: Enhancement/compensation site survey area

Source: Map data © OpenStreetMap contributors, Microsoft, Facebook, Google, Esri Community Maps contributors, Map layer by Esri

4.3.1 Upper littoral zone

The upper littoral was backed **by saltmarsh habitat (LS.LMp.SM)** (Figure 4.28), this was previously surveyed in 2024[11] and four saltmarsh communities were identified, comprising:

- *Suaeda maritima* saltmarsh;
- *Puccinellia maritima* saltmarsh sub-community with *Puccinellia maritima* dominant;
- *Halimione portulacoides* saltmarsh community with *Hailimione portulacoides* dominant; and
- *Festuca rubra* saltmarsh community.

A culverted creek flows out along the east end of the survey area (Figure 4.27), this is lined on the west side my sea purslane *Halimione portulacoides* (A) and features channel wrack *Pelvetia canaliculata* (C) on the concrete structure forming the mouth of the culvert and mud banks of the upper littoral. Substrate of the creek and upper littoral comprises **Littoral mud (LS.LMu)**. Green algae, likely sea lettuce *Ulva* spp. is found on the rocks, mud substrate and on the vegetation bordering the mud (F). An egg case of a common whelk *Buccinum undatum* was also noted.

Muddy pools were located throughout the saltmarsh, particularly in the western half of the survey area. These were noted to feature the sacoglossan sea slugs (cf. *Limapontia* spp. (C)) (Figure 4.30) and cf. Isopoda (O).

[11] RML, 2024. Dee Bridge Renewal Wepre and Greenfield Saltmarsh NVC Survey

Figure 4.26: Upper littoral facing west

Source: Mott MacDonald, 2025

Figure 4.27: Watercourse in east end of survey area, facing southeast

Source: Mott MacDonald, 2025

Figure 4.28: Saltmarsh habitat

Source: Mott MacDonald, 2025

Figure 4.29: Rocky area, upper littoral

Source: Mott MacDonald, 2025

Figure 4.30: Sea slugs in muddy pool amongst saltmarsh habitat

Source: Mott MacDonald, 2025

The upper littoral lining the saltmarsh along the north edge comprises dried mud (**littoral mud LS.LMu**). Mammal tracks were noted within the softer areas (Appendix **Error! Reference source not found.**, TN7), thought to be rat. A rocky area is present in the eastern end on the mud substrate (Figure 4.29), the rocks feature channelled wrack *Pelvetia canaliculata* (C), and a tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.) (A) on the upper littoral portion.

The western end of the survey area features an area of sea defence, comprising what appears to be construction debris of concrete and rebar. The terrestrial area above this comprises scrub dominated by buddleia and below this, orange lichen was noted. The upper littoral of the defences feature a zonation of the tubular green seaweed (F) as for the rocky area, with a band of channelled wrack *Pelvetia canaliculata* (A) below this (Figure 4.32).

4.3.2 Mid littoral zone

The mid littoral predominantly comprises **sandy mud and muddy sand (LS.LMu)**; the common cockle *Cerastoderma edule* (O) was identified within this area. Four rocky areas overlying the substrate were present at the mid littoral, which supports spiral wrack *Fucus spiralis* and bladder wrack *Fucus vesiculosus*, and hybridized individuals (A) (Figure 4.31 and Figure 4.32). The rock in the western end, forming the sea defence also features a band of channelled wrack *Pelvetia canaliculata* (A) extending from the mid to upper littoral. The non-native modest barnacle *Austrominius modestus* and rock barnacles *Semibalanus balanoides* (C) were also present within the rocky areas.

Figure 4.31: Mid to lower littoral, facing east

Source: Mott MacDonald, 2025

Figure 4.32: Mid to upper littoral, west end

Source: Mott MacDonald, 2025

4.3.3 Lower littoral zone

The lower littoral zone predominantly comprises medium to coarse barren sand (Figure 4.33 and Figure 4.34), forming the biotope **barren or amphipod-dominated mobile sand shores (LS.LSa.MoSa)**. In the western end of the survey area, a rock groyne extends cross-shore, this is dominated by spiral wrack *Fucus spiralis* and bladder wrack *Fucus vesiculosus*, these also displayed hybridized individuals (A).

Figure 4.33: Lower littoral, facing west

Source: Mott MacDonald, 2025

Figure 4.34: Lower littoral, facing east

Source: Mott MacDonald, 2025

Figure 4.35: Groyne in west end

Source: Mott MacDonald, 2025

5 Summary and conclusions

5.1 Summary

Overall, the proposed Scheme site was characterised by mud and sandy mud habitats consistent with an upper estuarine environment, fauna was generally limited to barnacles. Flora was also limited to few species, generally limited to hard structures.

The ALOF site comprised a mosaic of muds and sands in varying proportions, with fauna predominantly confined to the hard structures (fenders, concrete and sheet piles) and limited to barnacles. A high proportion of microplastic debris was also identified along the shore.

For the enhancement/compensation site, the saltmarsh was much larger in extent, featuring pools which supported sea slugs and isopod species. Rocky areas supported higher numbers and species of characteristic brown algae species more typical of coastal environments, such as spiral and bladder wracks. The lower littoral comprised barren sand with the mid characterised by a mosaic of sandy mud and muddy sand, featuring limited fauna, such as the common cockle *C. edule*.

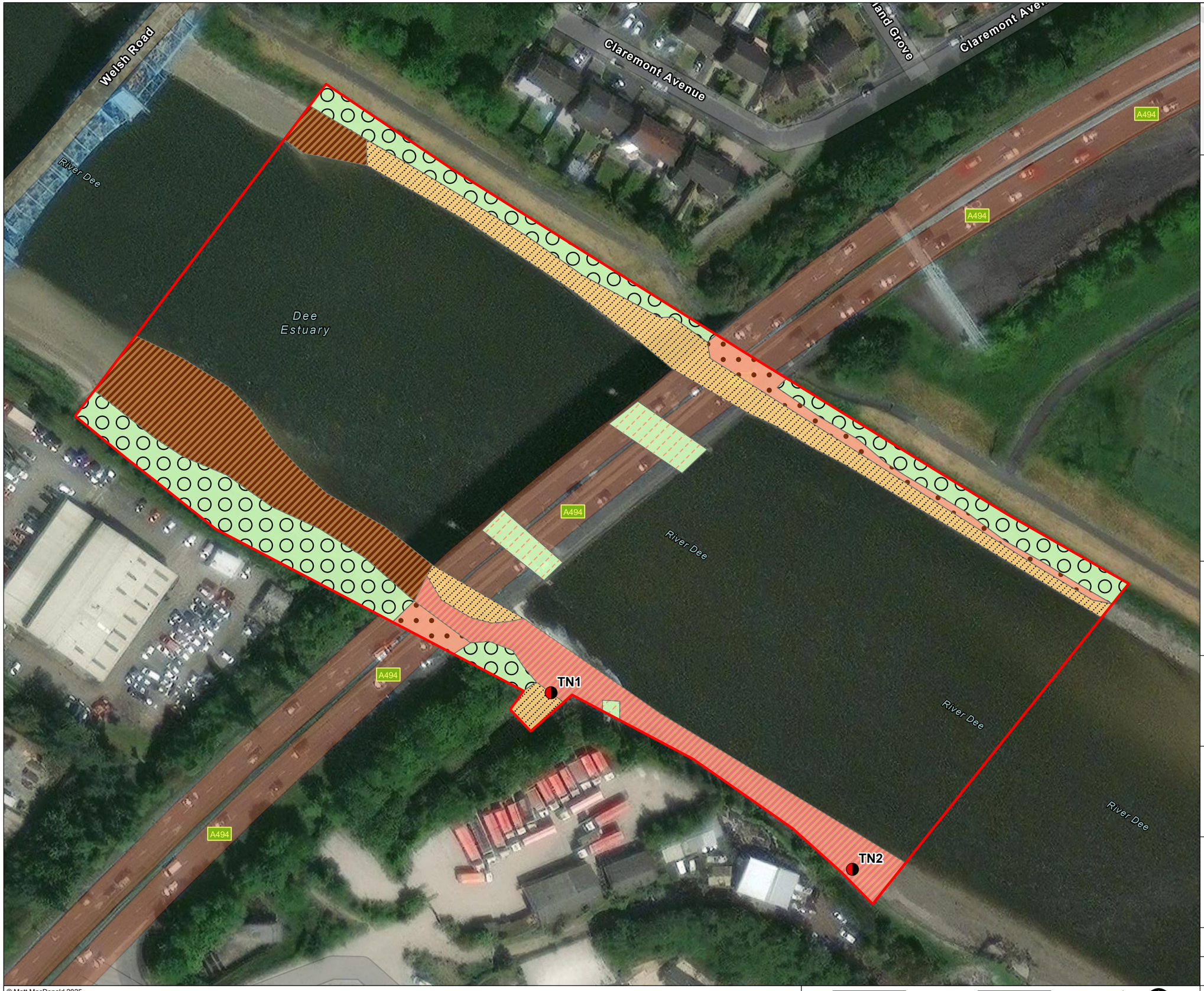
A summary of the biotopes observed within the survey areas have been outlined in Table 5.1. A total of seven biotopes were identified at the proposed Scheme location, five at the ALOF site and six at the Greenfield enhancement site.

Table 5.1: Summary of biotopes and species observed

Area	Biotopes	Associated species observed
Proposed Scheme site		
Upper littoral	Saltmarsh habitat LS.LMp.Sm	• Sea purslane *Halimione portulacoides* • Common scurvygrass *Cochlearia officinalis*
	Littoral mud LS.LMu	*Enteromorpha* spp.
	Littoral rock LR	Limited species present. Green algae present
	Littoral mixed sediment LS.LMx	No flora or fauna was observed
Mid littoral	Polychaete/bivalve dominated muddy sand shores	Limited holes indicative of burrows were identified
	Polychaete/oligochaete-dominated upper estuarine mud shores LS.LMu.UEst	• Modest barnacle *Austrominius modestus* • Rock barnacles *Semibalanus balanoides* • Tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.)
	Littoral mixed sediment LS.LMx	• Brown algal veneer
	Littoral mud LS.LMu	No flora or fauna was observed
Lower littoral	Littoral rock LR	• Tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.) • Brown algae • Barnacles (likely *A. modestus* and S. *balanoides*)
	Polychaete/oligochaete-dominated upper estuarine mud shores LS.LMu.UEst	• Modest barnacle *Austrominius modestus* • Rock barnacles *Semibalanus balanoides* • Tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.)
	Littoral mixed sediment LS.LMx	• Filamentous brown seaweeds

Area	Biotopes	Associated species observed
ALOF site		
Upper littoral	Saltmarsh habitat LS.LMp.Sm	● English scurvygrass *Cochlearia anglica* ● Common couch *Elytrigia repens*
	Littoral rock LR – slipway	N/A – overlain by saltmarsh.
	Littoral rock (and other hard substrata) LR – sheet piles and fenders	● Modest barnacle *Austrominius modestus* ● Rock barnacles *Semibalanus balanoides* ● Green algae ● Filamentous brown algae
	Fine muddy sand LS.LSa	No flora or fauna was observed
	Littoral mixed sediment LS.LMx	No flora or fauna was observed
Mid littoral		
	Littoral mud LS.LMu	No flora or fauna was observed
Lower littoral	*Hediste diversicolor, Macoma balthica* and *Scrobicularia plana* in littoral sandy mud LS.LMu.MEst.HedMacScr	● Baltic tellin *Macoma balthica* ● Peppery furrow shell *Scrobicularia plana* ● Dog whelk *Nucella lapillus* (casts) ● Blue mussel *Mytilus edulis* (casts)
	Littoral mixed sediment LS.LMx	Filamentous brown seaweeds
Enhancement/compensation site		
Upper littoral	Saltmarsh habitat LS.LMp.Sm	● Sea purslane *Halimione portulacoides* ● Sea slugs cf. *Limapontia* spp* ● cf. Isopoda* *Located within pools in the saltmarsh
	Littoral mud LS.LMu	● Channelled wrack *Pelvetia canaliculata* ● Green algae, likely sea lettuce *Ulva* spp. ● Common whelk *Buccinum undatum* egg case
	Littoral sandy mud LS.LMu (channel)	● Channelled wrack *Pelvetia canaliculata* ● Tubular green seaweed (likely *Blidingia* spp. or tubular *Ulva* spp.)
	Pelvetia canaliculata and barnacles on moderately exposed littoral fringe rock LR.MLR.BF.PelB	● Orange lichen ● Tubular green seaweeds ● Channelled wrack *Pelvetia canaliculata* ● Spiral wrack *Fucus spiralis* ● Bladder wrack *Fucus vesiculosus*
Mid littoral	Littoral sandy mud LS.LMu	● Common cockle *Cerastoderma edule*
	Barnacles and fucoids on moderately exposed shores LR.MLR.BF	● Spiral wrack *Fucus spiralis* ● Bladder wrack *Fucus vesiculosus* ● Channelled wrack *Pelvetia canaliculata* ● Modest barnacle *Austrominius modestus* ● Rock barnacles *Semibalanus balanoides*
Lower littoral	Barren or amphipod-dominated mobile sand shores LS/LSa.MoSa	No flora or fauna was observed

A. Habitat Map



- Site boundary
- Target note

Habitat type

- LR - Littoral rock
- LS.LMp.Sm - Saltmarsh
- LS.LMu - Littoral mud
- LS.LMx - Littoral mixed sediment
- LS.LMu.UEst - Polychaete/oligochaete-dominated upper estuarine mud shores
- LS.LSa.MuSa - Polychaete/bivalve-dominated muddy sand shores

Coordinate system: British National Grid; Datum: OSGB 1936
Data sources: Site boundary and habitat data: Mott MacDonald, 2025; Background mapping: Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, GeoTechnologies, Inc, METI/NASA, USGS, Maxar, Microsoft, Esri UK, Esri, TomTom, Garmin, GeoTechnologies, Inc, METI/NASA, USGS

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North & Mid Wales Trunk Road Agent

Yn gweithio ar ran **Llywodraeth Cymru**
Working on behalf of the **Welsh Government**

A494 River Dee Bridge Replacement Intertidal Walkover Survey Report

Intertidal Phase 1 Habitats Bridge Site

Drawn	GIS Checked	Checked	Approved
K Vahakuopus	**S Glover**	**A Jones**	**D Jones**
Scale at A3	Status	Revision	Security
1:1,000	**INF**	**01**	**STD**

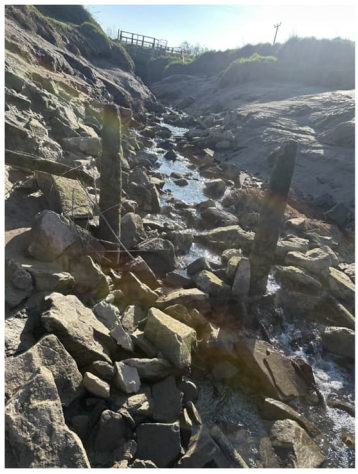
0 20 40 60 80 m

395318-MMD-00-XX-DR-Z-0015

B. Target Notes

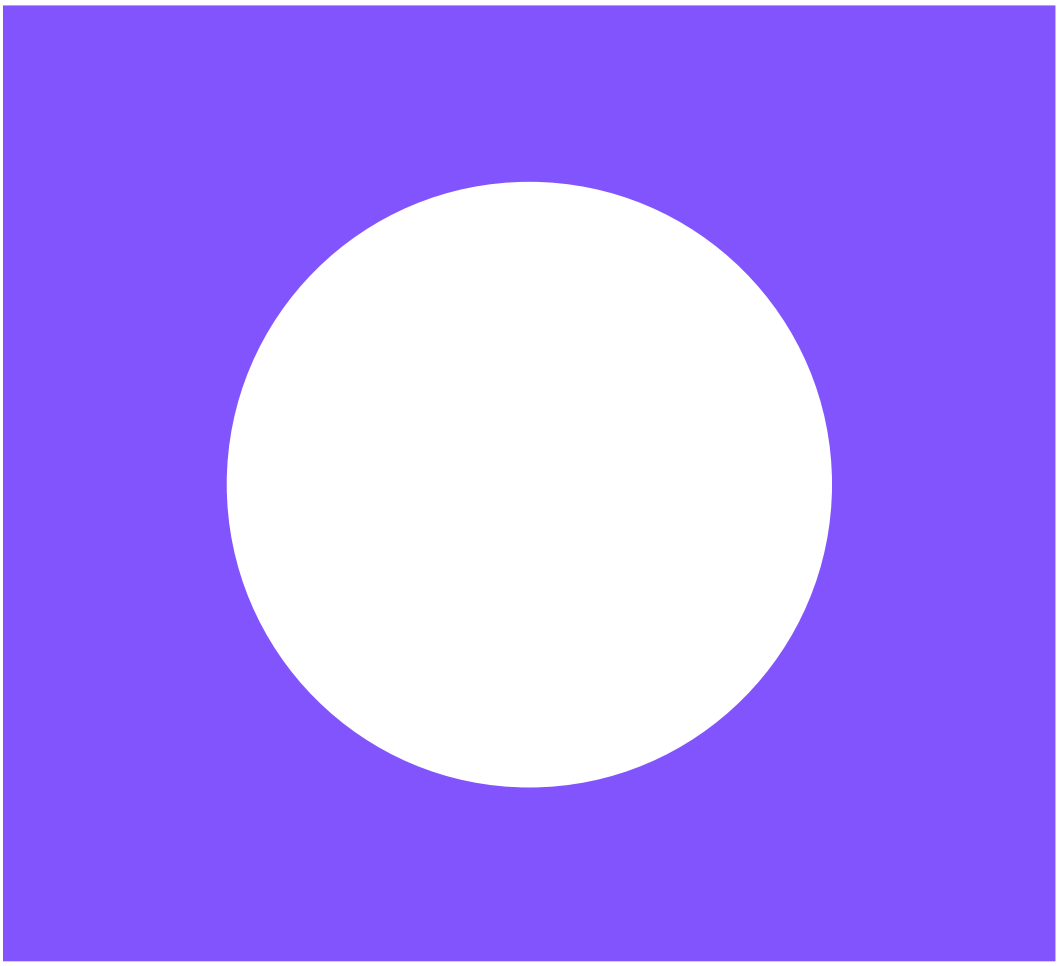
Target notes have been provided in Table B.1 below, the locations of these are outlined in Appendix A.

Table B.1: Target notes

Target Note ID	Description	Photograph (if applicable)
Proposed Scheme site		
TN1	Queensferry Drain Main River	
TN2	Wooden posts, likely remnants of a pontoon on the upper littoral	
ALOF site		
TN3	Beeches Drain Dee Main River (ID 15518), located adjacent to the west of the ALOF.	

Target Note ID	Description	Photograph (if applicable)
TN4	Mammal prints on the upper and mid littoral within the boundaries of the ALOF. Likely fox.	
TN5	Remnants of fence	
TN6	Metal supports/rails extending below the low water line	

Target Note ID	Description	Photograph (if applicable)
Enhancement/compensation area		
TN7	Footprints on upper littoral, thought to be rat.	



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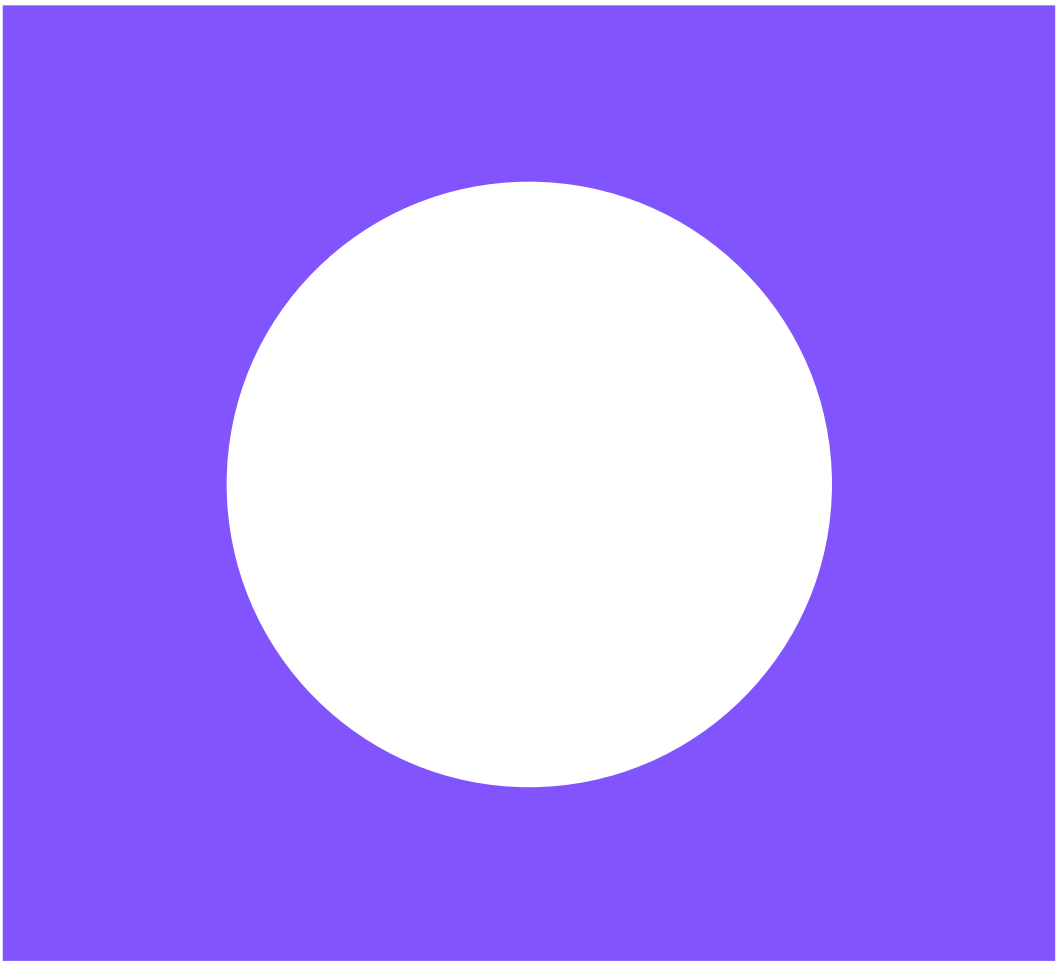

A494 River Dee Bridge Replacement Scheme

National Vegetation Classification (NVC) Survey Report

September 2025

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A494 River Dee Bridge Replacement Scheme

National Vegetation Classification (NVC) Survey Report

September 2025

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01		AW	CD	RP	For client comment

Document reference: 395318-RML-00-XX-RP-L-0009

Contents

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Figures

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Tables – Appendices

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Executive summary

Mott MacDonald Ltd. was appointed by North and Mid Wales Trunk Road Agency (NMWTRA) to undertake a botanical survey and assessment, with use of National Vegetation Classification (NVC) survey techniques on the banks of the River Dee in Flintshire, North Wales.

The Scheme comprises the construction of a new off-line single structure River Dee Bridge. It is deemed impractical to close the A494 to renew the existing bridge and thus the proposal is to provide a new structure to the south. This would replace the current River Dee Bridge with a new bridge immediately upstream, with the existing bridge being removed.

The requirement for the botanical survey is informed by the A494 River Dee Bridge Improvement Survey Report (intertidal) (document reference: 395318-MMD-00-XX-RP-Z-0012, Mott MacDonald) issued in March 2025 which suggested that habitats of higher distinctiveness may be present within the Scheme boundary or within the Zone of Influence (ZoI). The desk study undertaken as part of this report highlighted that the survey area (the 'Site') is a part of the wider River Dee Site of Special Scientific Interest (SSSI) designation as well as being mapped as coastal saltmarsh priority habitat. It also lies within the Afon Dyfrdwy a Llyn Tegid / River Dee and Bala Lake Special Area of Conservation (SAC) and is also located approximately 1.2km away from the Aber Dyfrdwy / Dee Estuary SAC which is primarily designated for the presence of Annex 1 saltmarsh habitats.

An NVC survey was undertaken on the 9 of July 2025. Species lists obtained on-site were considered with NVC vegetation keys, community descriptions and floristic tables. A TABLEFIT analysis was also undertaken to supplement this analysis and characterise key attributes of each stand with goodness of fit scores provided with each stand description.

The field survey identified three distinct saltmarsh stands within the Site, two on the north bank of the River Dee and one on the south bank. Those on the north bank could not be attributed to any NVC types, whilst the stand located on the south bank was assigned to the SM13 *Puccinellia maritima* salt-marsh community *Puccinellietum maritimae*. Subcommunity 'a' with *Puccinellia maritima* dominant.

The stands identified on site were compared with the criteria for coastal saltmarsh priority habitat as well as Annex 1 habitats predominantly associated with saltmarsh communities. The habitats on both banks were found to qualify as a coastal saltmarsh priority habitat as well as Annex 1 habitat Atlantic salt meadows.

It is recognised that impacts to the saltmarsh on both banks within the survey area is unavoidable due to the nature of the Scheme. However, it is recommended that adequate compensation measures, including on-site and off-site habitat enhancement and creation, are considered in-line with the stepwise approach and DECCA (Diversity, Extent, Condition, Connectivity and Aspects) framework for ecosystem resilience in order to achieve the mandatory net benefit for biodiversity (NBB) under the Environment (Wales) Act 2016.

It is recommended that SSSI assent be sought from Natural Resources Wales (NRW). It is also recommended that the results of this report are used in to inform a Habitat Regulations Assessment (HRA) to identify any likely significant effects on qualifying features of both SACs as a result of the works.

An ecologist should be consulted immediately if the scope of the proposed works is changed. This report is considered to be valid for 18 months after the date of survey. After this date the

report should be reviewed by a competent ecologist and an update site walkover (and subsequently a new report may be required.

1 Introduction

1.1 Project background

Mott MacDonald Ltd. was appointed by North and Mid Wales Trunk Road Agency (NMWTRA) to undertake a botanical survey and assessment, with use of National Vegetation Classification (NVC) survey techniques on the banks of the River Dee in Flintshire, North Wales. The River Dee Bridge is an essential link for cross-border traffic between north Wales, the north-south of England, and beyond. It connects people, communities, and businesses, carrying approximately 68,400 vehicles each day.

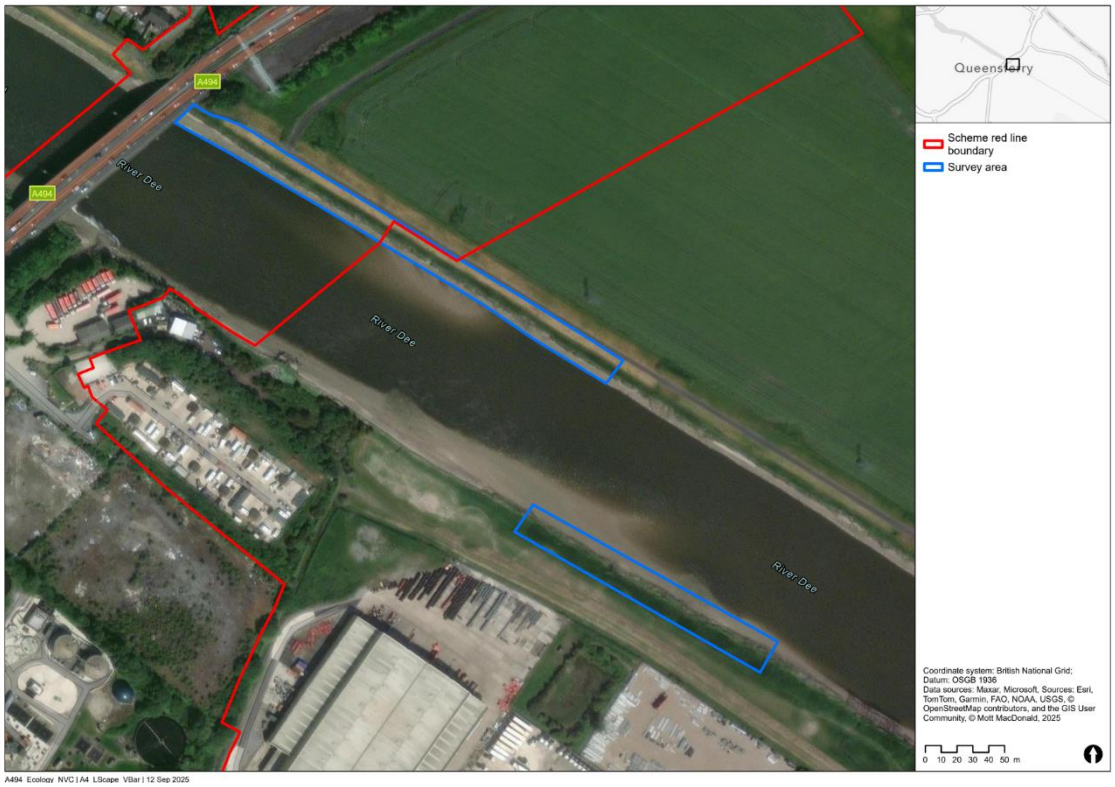
The Scheme comprises the construction of a new off-line single structure River Dee Bridge. It is deemed impractical to close the A494 to renew the existing bridge and thus the proposal is to provide a new structure to the south. This would replace the current River Dee Bridge with a new bridge immediately upstream with the existing bridge being removed.

The A494 River Dee Bridge Replacement (hereafter referred to as ‘the Scheme’) is required due to the poor structural condition of the existing bridge deck. Inspections and monitoring have shown that the frequency of repairs required is increasing each year, along with the risk of major interventions that would necessitate closing the bridge. If no action is taken, the bridge will continue to deteriorate, potentially leading to further weight restrictions and lane closures in the short to medium term and ultimately resulting in closure in the medium to long term.

The NVC survey was undertaken following a recommendation for further botanical surveys in the A494 River Dee Bridge Improvement Survey Report (intertidal) (document reference: 395318-MMD-00-XX-RP-Z-0012, Mott MacDonald) issued in March 2025. The NVC survey was primarily required to assess the survey area outlined in Figure 1.1, hereafter referred to as ‘the Site’ where the installation of the proposed new bridge structure will take place.

The Site is located at central grid references SJ 32663 68496 and SJ 32581 68380 (north bank and south bank, respectively). The northern bank is bordered by the north Wales coastal path – a linear hardstanding path. The southern bank features a strip of maritime grassland which grades into the saltmarsh habitat. Beyond the grassland habitat are urbanised areas including Deva industrial park and Queensferry water treatment works.

Figure 1.1: Survey boundary showing the Scheme red line boundary and the survey area



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

1.2 Background information

The south bank of the Site was highlighted during the desk study as being part of a wider network of habitat designated as coastal saltmarsh priority habitat (Defra, 2025). The Site is also part of the Afon Dyfrdwy a Llyn Tegid / River Dee and Bala Lake Special Area of Conservation (SAC) and lies approximately 1.2km away from the Aber Dyfrdwy / Dee Estuary SAC which is designated for its Annex I qualifying habitats, those being which examples of saltmarsh vegetative communities, including:

- Atlantic salt meadows (H1330), characterised by mid to upper saltmarsh vegetation dominated by species such as common saltmarsh-grass (*Puccinellia maritima*), red fescue (*Festuca rubra*), spear-leaved orache (*Atriplex prostrata*), and sea aster (*Tripolium pannonicum*);
- *Salicornia* and other annuals colonising mud and sand (H1310), representing pioneer saltmarsh vegetation on intertidal flats, typically dominated by marsh samphire (*Salicornia europaea*), annual sea blite (*Suaeda maritima*), and other annual halophytes; and
- S*partina* swards (H1320), found in lower marsh zones, dominated by *Spartina anglica*, often forming dense, monospecific stands.

The Site also lies within the Afon Dyfrdwy / River Dee Site of Special Scientific Interest (SSSI), designated in part for its saltmarsh transition habitats.

As a result, it is assumed that the habitats within the survey area have potentially high botanical value, and as such were targeted for inclusion in the NVC survey.

1.3 Aims and objectives

The primary aims of the NVC survey was to assess the composition, structure and conservation importance of both the plant communities and individual plant species present within the Scheme red line boundary and within the Zone of Influence (ZoI), which are due to be directly affected by the Scheme. The Zone of Influence regarding NVC surveys is outlined in section 3.1. The specific objectives of the NVC survey report are to:

- Confirm the presence of any Environment (Wales) Act section 7 habitats, Priority Habitats and Annex 1 habitats within the Site to inform the Environmental Statement; ;
- Identify any protected and/or notable plant species of conservation importance, which may occur within the Site;
- Identify any protected and/or important plant species (e.g. Species of Principal Importance (SPI), red-listed species) present within the Site, and assess their relevance to the Site's designation as a SSSI and SAC, with reference to the qualifying features of these designations;
- Provide maps of the NVC vegetation communities present in the Site;
- Recommend mitigation measures and opportunities for compensation and enhancement, to ensure alignment with good practice methodology and prevent adverse impacts on important plant species/habitats resulting from the proposed works; and
- Identify the presence of any invasive plant species in the Site.

2 Legislation and policy

The construction and operational activities for the Scheme must comply with the International, European and UK nature conservation legislation, and with national and local biodiversity policies. The key, relevant legislative drivers are summarised here.

2.1.1 Conservation of Habitats and Species Regulations 2017 (as amended)

In the UK, the plant species under Schedule 5 of the Conservation of Habitats and Species Regulations 2017 (as amended) are protected inter alia from being deliberately picked, collected, cut, uprooted or destroyed.

SACs are also protected under the Conservation of Habitats and Species Regulations 2017 (as amended). These Regulations require that any plan or project likely to have a significant effect on an SAC undergo a HRA. Where necessary, an Appropriate Assessment must demonstrate that the proposal will not adversely affect the integrity of the site. Public authorities must also take steps to avoid deterioration of habitats and disturbance to species for which the site is designated. These provisions ensure that SACs are managed and protected in accordance with their conservation objectives and maintain their ecological integrity.

Annex I habitats are defined under the European Union (EU) Habitats Directive (92/43/EEC), which aims to protect Europe's most important natural habitats. These habitats are used to inform the designation of SACs.

2.1.2 Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended). The Act makes it an offence to intentionally pick, uproot or destroy any wild plant listed in Schedule 8. The legislation also prohibits the uprooting of wild plants not listed in Schedule 8, unless the uprooting is carried out by the owner or occupier of the land on which the plant is growing, or by someone having their permission to do so, or unless the action is authorised in writing by the appropriate local authority, although such authorisation does not confer a right of entry to the land.

SSSIs are protected under Part II of the Act. This legislation requires landowners and occupiers to obtain prior written consent from Natural Resources Wales (NRW) before undertaking any activities listed as Operations Likely to Damage (OLDs) the special interest features of the site. Public bodies also have a statutory duty to take reasonable steps to further the conservation and enhancement of SSSIs when exercising their functions. NRW has enforcement powers to prevent or remedy damage to SSSIs. These provisions ensure that the ecological or geological features for which a site is designated are protected and appropriately managed.

2.1.3 The Environment (Wales) Act 2016

Under the Environment (Wales) Act 2016 ('the 2016 Act'), Local Authorities and public bodies have a statutory duty 'to seek to maintain and enhance biodiversity in Wales' when carrying out their normal functions. Section 7 of the 2016 Act contains a list of habitats and species of 'principal importance to the conservation of biodiversity in Wales' ('Priority Habitats or Species'), to act as an aid to guide public bodies in implementing their duty. In order to do this, the Local Authority must consider the impact of the proposed works on Priority Habitats and Species. The definitions for priority habitats are taken from the original UK Biodiversity Action Plans (UK BAP) as published by the Joint Nature Conservation Committee (JNCC).

Section 6 of the 2016 Act requires new development to maintain and enhance biodiversity and promote resilience of ecosystems. On this basis, and in line with national and local planning policy objectives, development in Wales should deliver net benefits for biodiversity (NBB) in ways that enhance ecosystem resilience, both in the short and long-term.

2.1.4 The Well-Being of Future Generations Act 2015

In Wales, local authorities also have a duty to achieve the seven well-being goals set out in the Well-Being of Future Generations Act 2015, the aim of which is to improve the social, economic, environmental and cultural well-being of Wales. Integrating biodiversity with all wellbeing goals should be targeted but in particular the goal for "A Resilient Wales" aims to achieve:

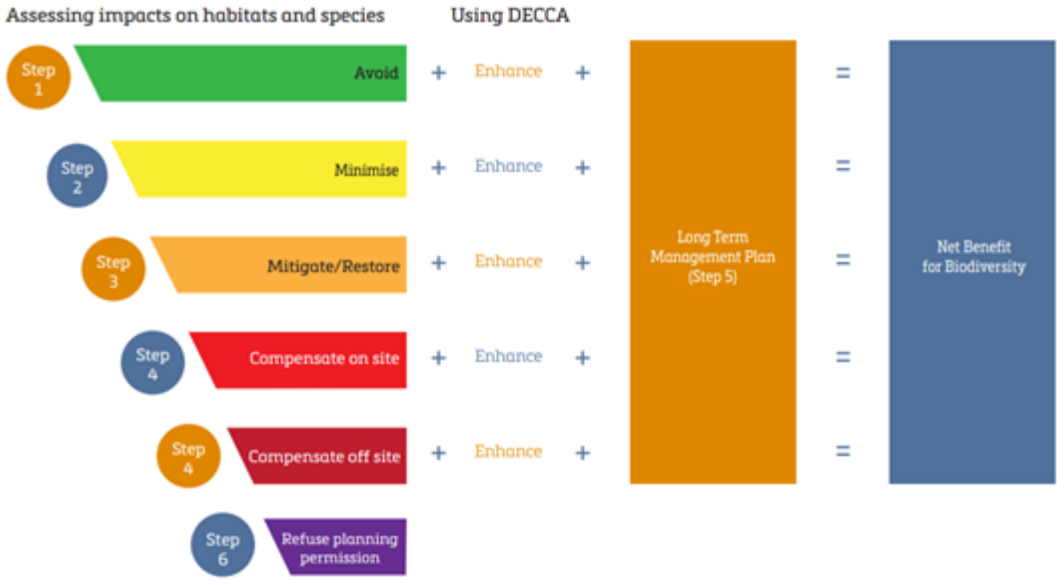
"A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example, climate change)."

2.1.5 Planning Policy Wales

2.1.5.1 Step-Wise Approach, Biodiversity Protection and Ecosystem Resilience

In terms of planning policy, under Chapter 6 of Planning Policy Wales (PPW) 2024, planning authorities follow a Step-wise Approach (see Figure 1.2) to maintain and enhance biodiversity, build resilient ecological networks and deliver net benefits for biodiversity.

Figure 2.1: The step-wise approach (mitigation hierarchy)



Source: Planning Policy Wales, 2024

This places a requirement on development to evidence consideration of biodiversity and the Step-wise Approach in decision making, which will include a need to:

- Support the conservation of native habitats and species, thus conserving biodiversity at a landscape scale and contributing to international responsibilities and obligations;
- Ensure statutory and non-statutory designated sites are properly protected and managed;
- Safeguard protected and/or Priority Habitats and Species from impacts which directly affect their nature conservation interests, comprises the resilience of ecological networks or the components which underpin them, such as water and soil, including peat deposits; and,

- Secure enhancement of, and improvements to, ecosystem resilience by improving Diversity, Extent, Condition, Connectivity and Adaptability of ecological networks (otherwise known as the DECCA framework).

A particular weight is placed on the importance of irreplaceable habitats and on peatlands, loss of which would only be permitted under wholly exceptional circumstances. Additionally, any development within the boundary of a designated site is considered unacceptable and will only be granted planning permission in exceptional circumstances.

3 Methodology

3.1 Zone of Influence

The current guidance on Ecological Impact Assessments (EcIA) (CIEEM, 2018) recommends that all ecological features that occur within a 'Zone of Influence' for a Scheme are investigated. The ZoI includes:

- Areas directly within the land take for the Scheme and access;
- Areas which will be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation.

The ZoI is variable depending on the ecological receptors affected. The size of survey areas is determined by considering the likely ZoI for each receptor. Table 3.1 below summarises the study area used for the desk study undertaken in the Intertidal Survey Report and the survey area used for ecological receptors.

Table 3.1: Survey/study areas used for this assessment

Ecological receptors	Survey/study area
Sites designated for their county or local importance	Site plus 2km
Habitats of Principal Importance and ancient woodland	Site plus 50m
Marine habitat and Phase 1 habitat survey	Site
Desk study records (for protected and notable species)	Site plus 2km

Source: Mott MacDonald, 2025

3.2 Desk study

A desk study was undertaken prior to the botanical survey in accordance with current guidelines for Preliminary Ecological Appraisal (CIEEM, 2017). This encompassed a review of available botanical and habitat records data for the area, alongside information on nearby statutorily designated sites. The following databases and literature were utilised:

- Botanical Society of Britain and Ireland (BSBI) distribution maps and databases;
- The Vascular Plant Red Data List for Great Britain;
- Flintshire Rare Plant Register;
- DataMap Wales; and
- Natural Resources Wales Priority Habitats layers on DataMap Wales

3.3 National Vegetation Classification (NVC) survey

An NVC survey of the Site was undertaken on the 9 of July 2025 during low tide by suitably experienced ecologists from Mott MacDonald, with Field Identification Skills Certificate (FISC) level 4. The Site was surveyed using the following methods based on the British Plant Communities series (Rodwell (ed.), 1991-2000) and the NVC users' handbook (Rodwell, 2006).

- Habitats were sampled using quadrats placed across areas of representative vegetation. In each 2x2m quadrat, a Domin score for each plant species was recorded (refer to Table 3.2). The data was subsequently combined to produce a floristic table for each type of vegetation.

- A map of quadrat locations is provided within Appendix A.
- Vegetation height and bare ground cover was also recorded; where slope and aspect were not recorded, samples were on flat ground.
- The use of specific vegetation software TABLEFIT was used to evaluate “goodness of fit” at individual quadrats and across the wider community. This was used as a guidance tool when assigning plant communities to each sampled quadrat. The results of the TABLEFIT analysis was used in conjunction with floristic tables, published NVC field keys and habitat descriptions to assist in the identification for each NVC community. The “goodness of fit” equates to the larger numbers given. The goodness of fit values for each NVC stand are reported in the results section of this report.
- Vegetation data was subsequently analysed with use of the Rodwell series’ (Rodwell (ed.), 1991-2000) community accounts, floristic tables and keys. Where possible, habitats were identified to sub-community level; however, where habitats show no strong affiliation with listed sub-communities, these were identified to community level only.
- The nomenclature for the vascular plants in this report follows the Botanical Society for Britain and Ireland (BSBI) taxon list (2024) for both scientific and English names. The bryophyte nomenclature follows Blockeel *et al*. (2021) for definitive scientific and English names.

Table 3.2: Assessment of percentage cover using Domin scale

Domin Scale	Percentage Cover
10	91-100
9	76-90
8	51-75
7	34-50
6	26-33
5	11-25
4	4-10
3	<4 many individuals
2	<4 several individuals
1	4< few individuals

Source: Rodwell, 2006

Measures for avoidance, mitigation, and compensation (aligned with the mitigation hierarchy) are provided in section 5.2.

3.3.1 Survey timings

The timings of the NVC survey were undertaken three hours either side of low tide on the 8th July 2025 which fell between 16:35 and 17:00. The survey was undertaken between 13:35 and 20:00. This ensured that the habitat was not submerged and was fully visible in order to make an appropriate assessment of the NVC communities present on site.

3.4 TABLEFIT outputs and Goodness of fit scores

TABLEFIT software was used to assist in the diagnosis of communities present. The software assigns likely communities present a score based on how closely they match the floristic tables in terms of species composition and relative abundance. Goodness of fit scores are meant to provide a rough guide.

The goodness of fit scores and their recommended ratings are given in Table 3.3 A few artificially enriched or sown vegetation types and semi-natural communities are not included in

the NVC types available to TABLEFIT, the TABLEFIT user manual states that will not get high goodness-of-fit ratings.

Table 3.3: Goodness of fit score and TABELFIT manual rating

Goodness of fit score	TABLEFIT rating
80-100	Very good
70-79	Good
60-69	Fair
50-59	Poor
0-49	Very poor

Source: Hill, M.O. (2015). TABLEFIT version 2.0 for identification of vegetation types

The overall goodness of fit TABLEFIT outputs are made up of up of four components which are as follows:

- Compositional satisfaction: whether the sample contains the correct species;
- Mean constancy of species: whether the species present should be there at the observed constancy / prevalence in the sward compared to the NVC types expected value;
- Dominance satisfaction: It measures whether those species that would be expected to have high abundance in the type are present with high abundance; and
- Dominance Constancy: weighted mean consistency of the dominant species.

3.5 Habitat classification frameworks

To assess the conservation significance of the vegetation communities recorded on Site, the NVC data collected was compared against relevant statutory and non-statutory habitat frameworks. Specifically, this included:

- Annex I habitats as defined under the EU Habitats Directive (Council Directive 92/43/EEC), with reference to habitat descriptions provided by the European Environment Agency and the Joint Nature Conservation Committee (JNCC);
- UK Biodiversity Action Plan (UK BAP) Priority Habitats, particularly Coastal Saltmarsh, as described in JNCC habitat guidance; and
- Section 7 Priority Habitats under the Environment (Wales) Act 2016, which continue the UK BAP habitat definitions for Wales and identify Habitats of Principal Importance for biodiversity conservation.

The classification process involved comparing the floristic composition, structure, and ecological function of NVC communities with the published definitions of these habitat types. Particular attention was given to Annex I habitat 1330 (Atlantic Salt Meadows) and Coastal Saltmarsh, both of which are relevant to the saltmarsh vegetation present on site. This approach ensured that the Site's vegetation was evaluated in the context of national and European conservation priorities.

3.6 Comparison of NVC communities with designated and Priority Habitats

The saltmarsh NVC communities identified on site were assessed for their correspondence with relevant conservation habitat classifications, including Annex I habitats under the EU Habitats Directive, UK BAP Priority Habitats, and Section 7 Priority Habitats under the Environment (Wales) Act 2016. Specifically, the vegetation was compared to the definitions of Annex I habitat 1330 (Atlantic and Continental Saltmarshes and Salt Meadows), Coastal Saltmarsh as listed in

the UK BAP, and the Coastal Saltmarsh Priority Habitat under Section 7. This comparison supports the evaluation of the site's conservation value and informs its relevance to statutory and non-statutory biodiversity frameworks.

3.7 Limitations

This report assesses the baseline botanical importance of the Site but does not constitute a full assessment of its importance for other ecological receptors.

Ecological surveys are limited by factors such as time of year, which affect the ability to detect plants. Optimal survey times vary between species and species groups therefore a single survey visit may overlook or under-record certain species. Some plant species may have not been in full flower and some swards were not in full growing period at the time of the visit, however the surveyors are skilled in identifying plant species from there vegetative characteristics and therefore this is not considered to represent a major limitation.

TABLEFIT diagnoses are based upon a statistical analysis of species lists collected on site and the association of tables published in British Plant Communities. Though they are trusted as an industry standard method, outputs from TABLEFIT should always be treated with caution, especially where species lists may be incomplete. Direct comparisons with the community descriptions provided in British Plant Communities must always be used to sense check the data, this is the approach we have followed within this report.

Due to health and safety concerns surrounding the location of a Gypsy, Roma and Traveller community near the south bank it was not possible to access areas closest to the bridge that lay within the survey area. This has been shown on the map in Appendix A. In this instance, the quadrat locations taken should be considered a proxy for the vegetative community closer to the bridge. It is considered unlikely that there would be any significant change in the overall community within this distance, with the habitats within the actual Scheme land-take having been viewed from a safe distance and from aerial and it is believed that the habitats are homogenous. Thus, this is not thought to be a significant limitation.

The survey was conducted during the low tide window on the date of survey. Access to small areas of the lower saltmarsh zone were limited due to health and safety concerns relating to the presence of sinking sand/mud as well as access and egress due to steep banks. However, this did not prevent the vegetative communities from being surveyed from a suitable distance (within 5m).

4 Results and interpretation

4.1 Desk study

The area of saltmarsh on the south bank within the Site was highlighted during the desk study as being a part of a wider network of habitat designated as a coastal saltmarsh priority habitat. The Site lies within the Afon Dyfrdwy a Llyn Tegid / River Dee and Bala Lake SAC and is located approximately 1.2km upstream from the Aber Dyfrdwy / Dee Estuary SAC which is designated for its Annex I habitats affiliated with saltmarsh communities. The Site is also part of the Afon Dyfrdwy / River Dee SSSI, designated in part for its saltmarsh transition habitats. The desk study results are included within the interpretation.

4.2 Previous survey work

The intertidal survey report (Mott MacDonald, 2025), undertaken in March 2025 documented all the intertidal habitat present under the existing bridge structure. It was noted that under the existing bridge structure the habitat is predominantly littoral mud with very little vegetation coverage. It is noted that this is likely due to the shading effects from the structure which means that vegetation cannot establish here due to the lack of sunlight.

4.3 NVC saltmarsh survey

The results of the NVC survey undertaken in July 2025 are presented below. For each community surveyed, a brief description of the structure and species composition is given, along with the NVC classification. A map showing the NVC communities on the Site is displayed in Appendix A. Appendix B provides floristic tables for communities and photos of communities and important plants are provided in Appendix C.

4.3.1 North bank - Stand 1: No NVC habitat type

This stand was located on the northern bank of the Site, situated at the top of the bank where the slope began to grade into flatter terrain away from the tide line. The assemblage, overwhelmingly dominated by common couch (*Elytrigia repens*), had a distinctly closed sward that was tussocky in nature. Amongst the densely packed sward were frequent associates including grass-leaved orache (*Atriplex littoralis*) and sea beet (*Beta maritima*). Very few other species were present contributing to the overall species-poor vegetative community.

TABLEFIT analysis gave a poor goodness of fit to an SM28 *Elytrigia repens* salt-marsh community *Elymetum repentis maritimum* (goodness of fit score: 52/100). The overall compositional satisfaction of the assemblage was also “poor” (score: 47/100), indicating that key indicator species were missing from the community. When comparing to the published literature, it is clear that several constant species which would be expected in an SM28 community, namely creeping bent grass (*Agrostis stolonifera*) and red fescue (*Festuca rubra*) are absent. The dominance satisfaction value was “fair” (score: 64/100). This is likely owed to the fact that common couch is present in the assemblage, but other key indicator species are absent.

A heavily graminoid dominated community such as this is characteristic of the upper limit of a saltmarsh which serves to terminate the saltmarsh habitat as it grades into other terrestrial habitats. On-site, this then grades into modified grassland which lines either side of the north Wales coastal path and adjacent agricultural land beyond. There is a possibility that the upper saltmarsh community as a consequence of the management practices adopted on the surrounding terrestrial habitats has impacted the floristic assemblage present. It appeared to be

a managed flood defence/embankment given the uniform mowing and slope and may have been seeded to retain soil in this area. Usually, common couch appears in patches which would allow for other, finer species to present in the sward. However, what was observed on site was an almost complete coverage of each quadrat by common couch. This could be due to the influence of several factors relating to anthropogenic influence and management:

The stand's proximity to the footpath and adjacent agricultural fields suggests a high likelihood of physical disturbance—such as trampling, mowing, or soil compaction—which may have reset successional dynamics and favoured the rapid colonisation by common couch grass, a species well-adapted to disturbed substrates via its aggressive rhizomatous growth. Additionally, the proximity to agricultural land raises the possibility of nutrient enrichment through runoff or leaching, particularly nitrogen. Elevated nutrient levels can promote dense monocultural growth and reduce species diversity, further reinforcing the dominance of common couch.

There may also be some natural causation to the vegetative community found on-Site. Although the Site lies along a river influenced by tidal activity, the steep and relatively high banks of the river mean that surface water runoff of rainwater from the land above, being freshwater in nature likely reduces overall salinity levels compared to more typical saltmarsh environments. This reduction in salinity may suppress halophytic species and further favour common couch which thrives in low-salinity, mesotrophic conditions.

When considered together, these factors—disturbance, reduced salinity and elevated topographical position, and nutrient input—may interact to produce a modified or transitional form of SM28, characterised by near-monodominance of common couch grass. While the species composition somewhat aligns with SM28, the structural and ecological context suggests this stand may represent a degraded or early successional variant of the community which cannot be attributed to an NVC community type.

4.3.2 North bank - Stand 2: No NVC type

This vegetation stand was clearly delineated from stand 1 of the north bank by the varying sward types observed between stands. Whereas stand 1 presented with a very closed and thick sward dominated by graminoids, stand 2 had a far more open sward with significantly more substrate exposed and was characterised by a greater presence of forbs. Sea purslane (*Sesuvium portulacastrum*) was the main constant in the assemblage with frequent associates including common couch, sea aster (*Tripolium pannonicum*) and spear-leaved orache (*Atriplex prostrata*) which presents as a floristic assemblage indicative of mid to upper saltmarsh vegetation. The substrate was intertidal mud, suggesting proximity to transitional areas.

The TABLEFIT analysis identified the closest statistical match as SM14 (*Halimione portulacoides* salt-marsh community), specifically the *Halimionetum portulacoidis* subcommunity. However, the goodness-of-fit score was low (52/100), indicating that the quadrat data diverges significantly from the diagnostic species composition and structure of SM14. This is supported by the very poor mean constancy score (24/100), meaning that the sample contains many species that ought to be rare or absent in that vegetation type.

SM14 is typically characterised by the dominance of Sea purslane, accompanied by common saltmarsh-grass (*Puccinellia maritima*), spear-leaved orache, and marsh samphire (*Salicornia europaea*), and is found in mid to upper saltmarsh zones with regular tidal inundation. While spear-leaved orache and sea aster were present in the surveyed quadrats, the absence of common saltmarsh-grass suggests that the assemblage does not reflect the typical structure or floristic composition of SM14.

Given the low statistical fit and the absence of several diagnostic species, the stand has been classified as "no NVC type." This classification reflects the ecological ambiguity of the assemblage, which may represent a transitional saltmarsh habitat influenced by local

environmental conditions, successional dynamics, or disturbance. The presence of intertidal mud and halophytic species such as spear-leaved orache sea aster suggests a mosaic of mid-marsh vegetation with elements of pioneer saltmarsh, but without sufficient diagnostic consistency to assign it confidently to SM14.

Stand 2 thus represents a structurally coherent saltmarsh assemblage with mid-marsh characteristics, but its floristic composition diverges from standard NVC types. While sea purslane is floristically consistent with SM14, the overall species composition and structure of the stand does not meet the threshold for confident NVC classification. The habitat is best described as a transitional saltmarsh assemblage with affinities to SM14, but lacking the diagnostic coherence required for formal assignment.

4.3.3 South bank – Stand 1: SM13 *Puccinellia maritima* salt-marsh community *Puccinellietum maritimae*. Subcommunity 'a' with *Puccinellia maritima* dominant

There was a clear zonation of saltmarsh communities on the south bank between the lower saltmarsh which then graded into littoral mud. The stand was overwhelmingly dominated by common saltmarsh-grass which formed a thick, dense carpet across much of the stand with a distinctively closed sward. In the very occasional areas where patches of bare substrate had not been colonised by the saltmarsh-grass, halophytic forbs such as spear-leaved orache and sea aster appeared as occasional associates.

TABLEFIT analysis provided the closest statistical match to an SM13 *Puccinellia maritima* salt-marsh community *Puccinellietum maritimae*. Subcommunity 'a' with *Puccinellia maritima* dominant with a "very good" overall goodness of fit score (score: 83/100). The compositional satisfaction value for this community type was also "very good" (score: 82/100), meaning that the floristic composition of the community present contains all of the necessary species. This is evident given the dominance of common saltmarsh-grass in the assemblage and that the description in the literature puts this as the only constant species in this community type. This species-poor appearance also corresponds to the accurate subcommunity 'a' where common saltmarsh-grass is dominant and other species are poorly represented (Rodwell, 2000). This is also consistent with a "very good" dominance satisfaction score (96/100) which suggests that the species that would be expected to have high abundance in the type are actually present with high abundance, which in this instance is the common saltmarsh-grass.

Overall, the TABLEFIT analysis, floristic keys and literature all marry up to confidently place this stand as an SM13a NVC community.

This habitat appeared to be consistent with the communities present within the Site itself when viewed from other side of the river. This is illustrated in the map in Appendix A.

4.4 Priority habitats

The UK BAP defines coastal saltmarsh as the upper, vegetated portion of intertidal mudflats, typically situated between mean high water neap tides and mean high water spring tides. Saltmarshes develop in sheltered locations such as estuaries, where fine sediments allow for the establishment of halophytic vegetation. Structurally, saltmarsh systems exhibit clear zonation, ranging from species-poor pioneer communities dominated by Salicornia spp. in the lower marsh, to more diverse mid-upper marsh assemblages. The upper tidal limits transition into drift line, swamp, or brackish communities. Functionally, saltmarshes play a vital role in sediment retention, tidal buffering, and supporting specialist invertebrates and bird species (BRIG, 2008). The Environment (Wales) Act Section 7 Coastal Saltmarsh habitat is a direct continuation of the UK BAP Coastal Saltmarsh definition.

4.4.1 North bank stands 1 and 2

Stands 1 and 2 on the north bank exhibit floristic and structural characteristics broadly consistent with the mid to upper zones of the coastal saltmarsh priority habitat. Dominant species included spear-leaved orache, sea aster, sea purslane, and common couch. These species are typical of mid-marsh vegetation and reflect the zonation described in the UK BAP citation. The presence of sea beet and grass-leaved orache further supports the classification of this area as mid to upper saltmarsh.

However, stand 2 presented a more ambiguous floristic profile. While sea purslane is consistent with the SM14 (*Sesuvium portulacastrum*) community and the broader saltmarsh habitat, the TABLEFIT analysis yielded a poor compositional match, and key diagnostic species such as common saltmarsh-grass were absent. As a result, this assemblage was classified as “no NVC type,” suggesting a transitional or ecologically variable habitat. Despite this, the dominance of halophytes and the presence of intertidal mud indicate that the site still falls within the structural bounds of the coastal saltmarsh priority habitat, albeit with atypical composition.

Functionally, the north bank supports the key processes outlined in the UK BAP citation. The vegetation contributes to sediment stabilisation and tidal buffering, and the zonation observed across quadrats reflects natural successional dynamics. The habitat structure is also consistent with the ecological role of saltmarsh in supporting biodiversity and estuarine resilience. Consequently these habitats should be considered as section 7 habitats under the Environment (Act) Wales.

4.4.2 South bank stand 1

Stand 1 on the south bank of the River Dee was dominated by common saltmarsh-grass, a definitive indicator of mid-marsh saltmarsh vegetation. Supporting species included spear-leaved orache, sea aster, and annual seablite (*Suaeda maritima*), with frequent bare intertidal mud. This assemblage aligns closely with the structural and floristic expectations of the coastal saltmarsh priority habitat, particularly the mid-marsh zone described in the UK BAP citation.

Functionally, the south bank supports all key attributes of the coastal saltmarsh priority habitat. The dominance of common saltmarsh-grass contributes to sediment retention and tidal buffering, while the presence of pioneer species and substrate variation suggests active geomorphological processes. These features enhance the site's capacity to support estuarine biodiversity and maintain ecological connectivity. The presence of annual seablite and exposed mud suggests proximity to pioneer saltmarsh, although glassworts and allies (*Salicornia* species) were not recorded. This absence may reflect local environmental conditions such as elevation, salinity, or sediment type, which may not currently favour *Salicornia* establishment, despite the presence of other early successional indicators. Stand 1 of the south bank thus reflects a well-developed and ecologically coherent saltmarsh system.

4.5 Annex 1 habitats

The Annex 1 habitats linked with coastal saltmarsh vegetative communities (and the Dee Estuary SAC) are defined by their floristic composition, tidal zonation, and ecological function within estuarine systems. In the UK, they typically correspond to specific National Vegetation Classification (NVC) communities, including SM13 (*Puccinellia maritima* saltmarsh), SM14 (*Halimione portulacoides* saltmarsh), and SM8 (Annual *Salicornia* saltmarsh) (JNCC, 2023; European Commission, 2013).

4.5.1 North bank stands 1 and 2

Quadrat stands 1 and 2 on the north bank exhibit floristic characteristics broadly consistent with Atlantic salt meadows (H1330). Dominant species included sea purslane and common couch,

with additional records of occasional halophytic forbs. These species are typical of mid to upper saltmarsh zones and retain their structural and ecological affinities with Atlantic salt meadows in spite of not being assigned any definitive NVC community. Structurally, the north bank reflects a well-developed saltmarsh gradient, with zonation from upper to mid marsh and halophytic diversity consistent with Annex I habitat H1330.

No *Salicornia* species were recorded in the north bank quadrats, and annual sea blite was absent, limiting alignment with pioneer saltmarsh communities (H1310). Similarly, no *Spartina* species were observed, ruling out correspondence with *Spartina* swards (H1320).

South bank stand 1

Stand 1 on the south bank was dominated by common saltmarsh-grass, a definitive indicator of Atlantic salt meadows (H1330) and the NVC community SM13. Supporting species included spear-leaved orache, sea aster, and annual sea blite, alongside frequent bare intertidal mud. This assemblage aligns closely with the structural and floristic expectations of H1330, particularly the mid-marsh zone where common saltmarsh-grass forms swards on soft intertidal sediments.

The presence of common saltmarsh-grass and exposed mud suggests minor influence from pioneer saltmarsh vegetation (H1310), although marsh samphire was not recorded. The absence of common cordgrass indicates that the site does not represent *Spartina* swards (H1320), which are often associated with lower marsh zones and sediment stabilisation.

4.6 Comparison with descriptions of designated sites' citations

All three stands surveyed share several key structural and floristic characteristics described within both the Dee Estuary SAC and the River Dee SSSI, both of which represent examples of estuarine saltmarsh habitats in Britain. It should be noted that the Site does not lie within the SAC itself which at its closest point is 1.2km away. The Site does, however, lie within the SSSI designation.

The Dee estuary SAC includes several Annex I habitat types relevant to saltmarsh vegetation as its primary qualifying features as noted in section 4.5. The floristic stands observed within the Site align well with Annex 1 Atlantic salt meadows habitat.

The River Dee SSSI citation emphasises the presence of structural diversity of the saltmarsh, shaped by tidal and fluvial processes, and the importance of saltmarsh zonation from pioneer communities to upper marsh assemblages. The SSSI recognises the estuary's geomorphological features and its role in supporting estuarine species, including migratory fish and otters (*Lutra lutra*) (Natural Resources Wales, 2023). The SAC also specifically identifies the need to maintain zonation, as well as the ecological conditions required for species such as otter, Atlantic salmon (*Salmo salar*), and freshwater pearl mussel (*Margaritifera margaritifera*) (JNCC, 2023). Functionally, both the SAC and SSSI citations emphasise the importance of maintaining habitat integrity, supporting hydrological and sedimentary processes including tidal buffering, and ensuring connectivity for protected estuarine species.

Stands 1 and 2, located on the north bank of the River Dee comprised a species assemblage consistent with mid to upper saltmarsh zones with relevant dominant species. Structurally, the north bank stands exhibit clear zonation from upper marsh species such as sea beet and common couch grass to mid-marsh halophytes like spear-leaved orache and sea aster. This pattern aligns with both SAC and SSSI expectations for saltmarsh transition habitats. Although none of the rare species listed in the SSSI citation were recorded, the diversity and composition reflect a representative saltmarsh community with ecological integrity.

Stand 1 of the south bank was dominated by common saltmarsh-grass, a definitive indicator of Atlantic salt meadows and the NVC community SM13 (*Puccinellia maritima* saltmarsh). Its floristic profile aligns strongly with the SAC's Atlantic salt meadow habitat and reflects the SSSI's emphasis on structural diversity shaped by tidal processes. The presence of annual seablite and exposed mud suggests minor influence from pioneer saltmarsh communities, although *Salicornia* species were not recorded. No *Spartina* species were observed, ruling out alignment with *Spartina* swards.

The north bank quadrats contribute to the conservation objectives of the SAC and SSSI citations by supporting halophytic vegetation that stabilises sediment and buffers tidal flow. The observed zonation and species diversity enhance habitat resilience and provide ecological corridors for estuarine species. The south bank quadrats reflect a stable mid-marsh platform that contributes to sediment retention, nutrient cycling, and hydrological buffering. The presence of intertidal mud and pioneer species suggests active geomorphological processes, consistent with the SSSI's functional emphasis. These features also support the objective of the SAC of maintaining estuarine dynamics and connectivity for protected species.

Despite being designated under the Afon Dyfrdwy a Llyn Tegid / River Dee and Bala Lake SAC, no habitats observed on Site could be matched to its Annex I qualifying habitats which are predominantly freshwater in nature, and the habitats on Site being predominantly halophytic which correspond more so to the qualifying features of the Dee Estuary SAC.

4.7 Rare and protected plant species

Plants listed on the Wales Red List 2008 and the BSBI rare plant register for Flintshire (Wynne et al., 2008) were noted during the surveys. No rare or protected plants from the Wales Red List or the Flintshire rare plant list were identified.

No plants which are listed under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) are present in the Site. No plants listed Section 7 of the Environment (Wales) Act 2016 are present in the Site.

4.8 Invasive non-native species (INNS)

No INNS (listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended) were recorded during the field survey.

5 Conclusions and recommendations

5.1 Conclusion

Two stands of varying vegetative community compositions of saltmarsh affinities were identified on the north bank of the river Dee during the NVC survey within the proposed works area. One stand was identified on the south bank.

Stand 1 of the southern bank closely resembled an SM13 *Puccinellia maritima* salt-marsh community *Puccinellietum maritimae*, Subcommunity 'a' with *Puccinellia maritima* dominant saltmarsh community type. However, stands 1 and 2 of the northern bank were unable to be matched with any known NVC type.

The south bank is currently mapped as coastal saltmarsh priority habitat. Both the north and south banks of the River Dee exhibit structural and functional characteristics consistent with the UK BAP definition of coastal saltmarsh which is a section 7 priority habitat. The north bank reflects a mid to upper marsh assemblage, with some transitional or atypical elements in stand 2. The south bank presents a stable mid-marsh community dominated by common saltmarsh-grass, with clear zonation and functional integrity. While compositional variation exists between the two banks, both contribute meaningfully to the ecological role and conservation value of coastal saltmarsh as a priority habitat. Thus both banks within the survey area and proxy can be placed within the coastal saltmarsh priority habitat.

Functionally, both banks contribute also to the ecological roles defined for Annex I saltmarsh habitats. These include sediment retention, tidal buffering, and habitat provision for estuarine fauna. The south bank, in particular, supports a coherent mid-marsh assemblage with strong floristic integrity, while the north bank reflects a more variable and transitional saltmarsh system with affinities to Atlantic salt meadows (H1330) (*Glauco-Puccinellietalia maritimae*) Annex 1 habitat. These habitats are a primary qualifying feature of the Dee Estuary SAC, lying approximately 1.2km away from the Site.

5.2 Recommendations

5.2.1 Avoidance

Under the Stepwise approach, any effects to the to the habitats on the south bank specifically should be avoided where possible given the high biodiversity value of the habitats present. However, it is recognised that due to the nature of the Scheme design this is likely not achievable as the new bridge will be required to stretch over both banks. In which case, the Scheme will be required to demonstrate that it has considered all avenues for proportional mitigation which sufficiently contributes to NBB.

5.2.2 Mitigation

It is recommended that impacts to the saltmarsh habitat on both banks within the survey area be minimised as much as possible in-line with the stepwise approach to reflect the high biodiversity value of these vegetative communities.

It is likely that some impacts to all three stands are unavoidable. It is likely that a compensation package will be required should any loss of any stand occur as a result of the proposed works. This is due to the floristic assemblages and their functional roles on both banks meeting the criteria for both coastal saltmarsh priority habitat and Annex 1 Atlantic salt meadows habitat. Loss of priority habitat is likely to be unacceptable unless a bespoke mitigation strategy for

minimising and enhancing areas of these habitats should be agreed with the NRW and the Local Planning Authority (LPA) as part of the planning process.

5.2.3 Compensation and enhancement

5.2.3.1 On-site habitat re-instatement

The existing bridge structure within the Scheme red line boundary is currently exerting a shading effect on the intertidal habitat beneath, resulting in suppressed light levels and altered microclimatic conditions. Both the north and south banks directly beneath the bridge comprise upper and mid-littoral mud, with minimal vegetative cover observed (A494 River Dee Bridge Improvement Survey Report (intertidal). (Mott MacDonald, 2025). Document reference: 100395318-MMD-00-XX-RP-Z-0012). The removal of the bridge is expected to restore more natural environmental conditions—particularly light availability and temperature—thereby facilitating the passive re-colonisation of saltmarsh vegetation over time. Adjacent to the bridge abutments, established saltmarsh communities are present on both banks, as documented in the intertidal survey report, and these are likely to act as source populations for natural revegetation.

Given the ecological significance of both priority habitat (coastal saltmarsh) and Annex I habitat 1330 (Atlantic salt meadows), it is essential that any re-established vegetation reflects the characteristic structure and species composition of these habitat types. The objective should be to achieve a like-for-like replacement of the lost saltmarsh assemblages. To ensure this outcome, a robust environmental monitoring and management plan must be implemented post-bridge removal .

The objective of the plan should be to eventually achieve floristic assemblages matching as like-for-like as possible the saltmarsh habitat adjacent on both banks. In the short-term (0-5 year post-bridge removal), the restoration goals of the site should be to facilitate the natural colonisation of saltmarsh species. Through this, it is recommended that at an agreed upon percentage cover (for example 50-70% would be achievable according to previous studies such as Shephard *et al.,* 2011) of target saltmarsh species should be achieved (those recorded during the NVC survey and recorded in Table B.1, Table B.2 and Table B.3). Both the hydrological and sediment conditions conducive to saltmarsh development should be established during this period. Management actions for years 0-1 to facilitate these objectives should include the removal of any debris to facilitate natural re-vegetation, the grading and stabilising of banks if needed to match the adjacent marsh elevation and the installation of sediment traps or coir rolls if erosion risk is deemed high. In the long term (5+ years post-bridge removal) the objective should be to achieve and maintain habitats with a floristic composition parity with adjacent saltmarsh, representing a stable saltmarsh community which can withstand tidal and climatic variations. These habitats should be maintained with minimal invasive species present. Management actions during years 1-5 are recommended to include passive restoration where natural colonisation takes place. Monitoring may include quarterly vegetation surveys as well as soil salinity and elevation checks. If colonisation is less than the desired amount by year 2, assisted planting using plug plants, matting or seed from adjacent marsh should be considered. If invasive species appear, manual removal or targeted control should be initiated.

The removal of the bridge and reversal of shading effects, combined with a targeted management strategy, is expected to compensate for habitat loss and contribute positively to NBB.

5.2.3.2 On-site habitat enhancement

Stand 1 of the north bank, assigned “no NVC type” owing to the overwhelming dominance of common couch resulting in a sward which has lost its natural character could be subject to enhancement of its ecological condition.

The objective should be to guide the stand toward a more typical SM28 (*Elymus repens* saltmarsh) NVC community assemblage. In order to achieve this objective, targeted habitat enhancement should focus on reducing the dominance of common couch grass and promoting structural and floristic diversity. This could involve managing disturbance from adjacent infrastructure, such as the cycle path, and mitigating nutrient input from nearby agricultural fields, both of which may be contributing to the grass’s near-monodominance. Improvements in management, such as cutting and removal of arisings to remove nutrients from the sward could also be implemented. Encouraging natural successional processes and facilitating colonisation by associated grasses and forbs—through reduced trampling, controlled grazing, or selective vegetation management—may help restore the tufted, species-rich structure characteristic of SM28 which includes finer grasses such as red fescue and creeping bent grass and are characteristic of an SM28 assemblage. Over time, such interventions could support a shift from a degraded or transitional state toward a recognisable NVC community.

This NVC community would likely share even stronger affinities with Annex 1 saltmarsh habitats and thus would contribute positively to NBB.

5.2.3.3 Off-site compensation

It is understood that NRW has proposed an area of saltmarsh and mudflat habitat at Greenfield Saltmarsh (Ordnance Survey Grid Reference: SJ 20711 77252) as a potential off-site compensation area. Current observations suggest that the extent and condition of the saltmarsh may be constrained by the presence of fly-tipped rubble piles within the site. These features are likely altering the microtopography and hydrological regime, thereby inhibiting the natural colonisation and expansion of saltmarsh vegetation by modifying elevation and water retention characteristics.

To address this, it is recommended that the removal of rubble piles be prioritised to restore more favourable environmental conditions, thereby facilitating the natural regeneration and expansion of saltmarsh habitat. This intervention would contribute to both an increase in habitat extent and an improvement in ecological condition, aligning with the objective of delivering mandatory NBB.

To ensure the success of this compensation measure, a separate robust environmental monitoring and management plan must be implemented. The overall aim of this plan should be to increase the extent of the saltmarsh across the area of mudflat post-debris removal. The monitoring objective of the monitoring and management plan in years 1-5 should be to assess the progress of the area of mudflat in naturally re-colonising towards that of an SM13a NVC community which is currently present on site according to the baseline survey as reported by Richards, Moorehead and Laing (RML) in their initial NVC survey report for Greenfield issued in June 2024 (Dee Bridge Renewal Wepre & Greenfield Saltmarsh NVC Survey (RML, 2024). Document reference number 3094/11). This community should be considered as the target end habitat as it closely resembles Annex I Atlantic salt meadows habitat and thus reflects a high biodiversity value. This community is already present on-site though its extent is likely hindered by the piles of rubble. A target total percentage vegetative cover of the mudflat and percentage SM13a cover should be agreed upon (≥70% cover by year 5; ≥80% SM13a by year 5 for example). The cover of vegetation is recommended to be monitored quarterly for years 1-5 post-rubble removal, through fixed quadrats and aerial imagery surveys. Species composition should also be monitored annually by means of further NVC surveys. Should low natural colonisation of saltmarsh species occur (e.g. <30% by year 2) then assisted planting using plug

plants, matting or seed should be considered. These should be appropriate for an SM13a vegetation community. Other parameters to be monitored should include the elevation change and hydrology. The elevation change should be monitored annually and is recommended to aim to be within ±5 cm of the adjacent SM13a community. The hydrology should include regular tidal inundation logs which should aim to be regular enough to support an SM13a community.

This off-site compensation measure contributes to achieving the net gain component of NBB with a potential gain in annex 1 saltmarsh community of approximately 0.02km^2 off-site. Elsewhere within the project, sufficient habitat compensation has already been delivered to ensure no net loss of biodiversity. Therefore, the enhancement of saltmarsh extent and condition at Greenfield Saltmarsh represents an additional ecological gain, supporting the overall objective of delivering a measurable net benefit for biodiversity across the Scheme.

It is recommended that any enhancement or compensation programmes are discussed with and agreed with NRW. Given that the survey area lies close to a SSSI it is also recommended that assent is sought from NRW.

It is also recommended that the results of this report are used in to inform a Habitat Regulations Assessment (HRA) to identify any likely significant effects on qualifying features of the Afon Dyfrdwy a Llyn Tegid / River Dee and Bala Lake SAC and Aber Dyfrdwy / Dee Estuary SAC as a result of the works.

6 References

Blockeel, T. L., Bell, N. E., Hill, M. O., Hodgetts, N. G., Long, D. G., Pilkington, S. L., & Rothero, G. P. (2021). A new checklist of the bryophytes of Britain and Ireland, 2020. Journal of Bryology, 43(1), 1–51. Available URL for download: https://doi.org/10.1080/03736687.2020.1860866 [Last accessed 16 July 2025].

Botanical Society of Britain and Ireland Taxon List (2024). Available at: BSBI: Taxon lists. [Accessed 18 August 2025].

Botanical Society of Britain and Ireland (BSBI) (n.d.) Distribution Maps. Available at: https://bsbi.org/maps [Accessed 18 August 2025].

BRIG (ed. Maddock, A.) (2008). *UK Biodiversity Action Plan Priority Habitat Descriptions: Coastal Saltmarsh*. Joint Nature Conservation Committee. Available at: https://data.jncc.gov.uk/data/6e4e3ed1-117d-423c-a57d-785c8855f28c/UKBAP-BAPHabitats-08-CoastSaltmarsh.pdf

BSBI (Botanical Society of Britain and Ireland). BSBI Distribution Database. Available at: https://database.bsbi.org/ [Accessed 18 August 2025].

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester. Available online.

CIEEM (2017). Guidelines for Preliminary Ecological Appraisal, Second Edition. Chartered Institute of Ecology and Environmental Management, Winchester. Available at: https://cieem.net/wp-content/uploads/2018/01/Guidelines-for-Preliminary-Ecological-Appraisal-Jan2018-typo-edit.pdf [Accessed 18 August 2025].

Department for Environment, Food & Rural Affairs (Defra). (n.d.) *MAGIC Map Application*. Available at: https://magic.defra.gov.uk/MagicMap.html [Accessed: 12 September 2025].

European Commission (2013). *Interpretation Manual of European Union Habitats – EUR28*. DG Environment, Brussels.

Hill, M.O. (2015). TABLEFIT version 2.0 for identification of vegetation types available via Centre for Ecology and Hydrology.

JNCC (2023). *Dee Estuary SAC Standard Data Form*. Available at: https://sac.jncc.gov.uk/site/UK0030131

JNCC (2023). *Atlantic Salt Meadows (Glauco-Puccinellietalia maritimae) – Habitat Description*. Available at: https://sac.jncc.gov.uk/habitat/H1330/

Mott MacDonald (2025). A494 River Dee Bridge Improvement Survey Report. Document reference number: 395318-MMD-00-XX-RP-Z-0012.

Natural Resources Wales (2023). *River Dee SSSI Citation Document*. Available at: https://naturalresources.wales/media/677391/sssi_2554_citation_en001.pdf

Richards, Moorehead and Laing (RML) (2024). Dee Bridge Renewal Wepre & Greenfield Saltmarsh NVC Survey. Document reference number: 3094/11.

Rodwell, J. S. (Ed.). (2006) National Vegetation Classification: Users' Handbook. Peterborough: Joint Nature Conservation Committee.

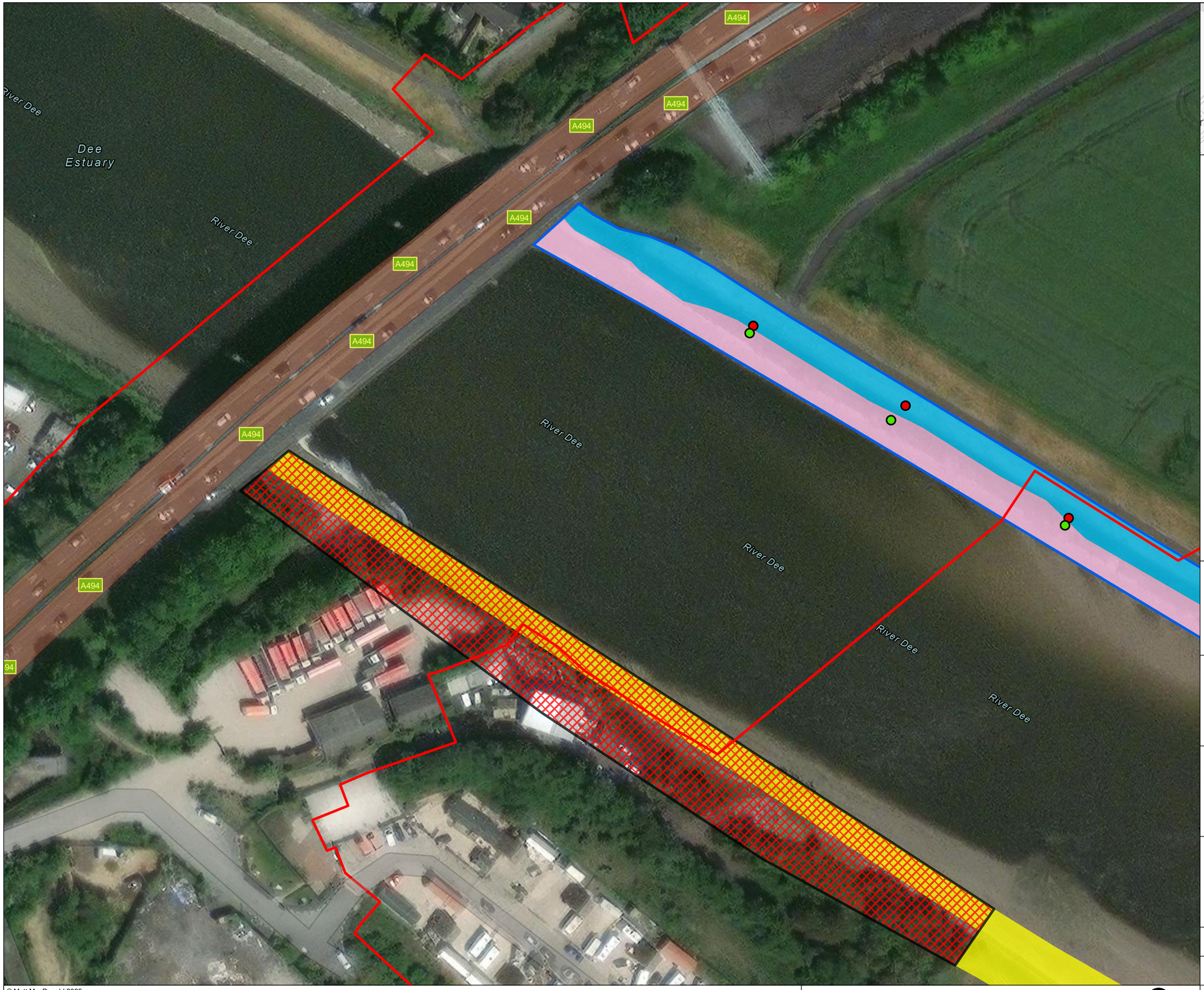
Rodwell, J.S. (2000). *British Plant Communities Volume 5: Maritime Communities and Vegetation of Open Habitats*. Cambridge University Press.

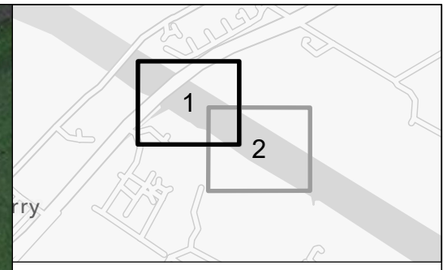
Shepard, C.C., Crain, C.M., & Beck, M.W. (2011). *The Protective Role of Coastal Marshes: A Systematic Review and Meta-analysis*. PLoS ONE, 6(11), e27374. https://doi.org/10.1371/journal.pone.0027374

Welsh Government. *DataMapWales* – Map Viewer. Available at: https://datamap.gov.wales/maps/new [Accessed 18 August 2025].

Wynne, G., Phillips, J. and Williams, D. (2008). The Rare Plants of Flintshire. Available at: Flintshire-RPR-6-mar-2008-1.pdf [last accessed: 18 July 2025].

A. Quadrat locations and NVC habitat type





Scheme red line boundary
Survey area
No access

Stand

1
2

National vegetation classification (NVC)

SM13a Puccinellia maritima salt-marsh community
No NVC type (Common couch dominant community)
No NVC type (Sea purslaine dominant community)

National Vegetation Classification Survey Data: National Vegetation Classification Survey Data

Coordinate system: British National Grid; Datum: OSGB 1936

Data sources: Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, © Mott MacDonald, 2025

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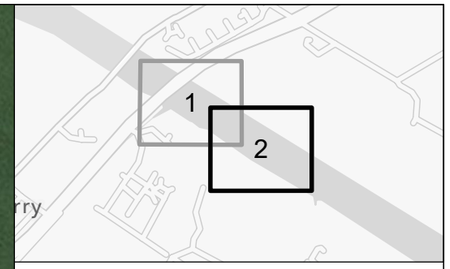
A494 River Dee Bridge Replacement Scheme
Saltmarsh National Vegetation Classification
Sheet 1 of 2

Drawn	GIS Checked	Checked	Approved
M Hergest	**W Carter**	**C Dow**	**R Purslow**
Scale at A3	Status	Revision	Security
1:1,000	**INF**	**01**	**STD**

395318-RML-ZZ-DR-L-2011

0 10 20 30 40 m



Scheme red line boundary
Survey area
No access

Stand

1
2
3

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A494 River Dee Bridge Replacement Scheme
Saltmarsh National Vegetation Classification
Sheet 2 of 2

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Scale at A3	Status	Revision	Security
1:1,000	**INF**	**01**	**STD**

395318-RML-ZZ-DR-L-2011

0 10 20 30 40 m

B. NVC community species lists and frequency

Table B.1: North bank stand 1 – No NVC type

Species list		Domin					Total	
Common name	**Scientific name**	**Quadrat 1: SD 91333 97855**	**Quadrat 2: SD 91339 97867**	**Quadrat 3: SD 91339 97873**	**Quadrat 4: SD 91348 97873**	**Quadrat 5: SD 91348 97879**	**Frequency**	**Range**
Grasses								
Common couch grass	*Elytrigia repens*	7	9	9	9	8	V	7-9
Forbs								
Grass-leaved orache	*Atriplex littoralis*	0	0	0	1	0	I	0-1
Spear-leaved orache	*Atriplex prostrata*	5	6	5	7	7	V	5-7
Sea beet	*Beta maritima*	0	2	6	6	4	IV	0-6
Hoary cress	*Lepidium draba*	0	0	0	0	5	I	0-5

Source: Mott MacDonald, 2025

Table B.2: North bank stand 2 – No NVC type

Species list		Domin					Total	
Common name	**Scientific name**	**Quadrat 1: SD 91333 97855**	**Quadrat 2: SD 91339 97867**	**Quadrat 3: SD 91339 97873**	**Quadrat 4: SD 91348 97873**	**Quadrat 5: SD 91348 97879**	**Frequency**	**Range**
Grasses								
Common couch	*Elytrigia repens*	2	2	5	0	4	IV	0-5
Forbs								
Sea purslane	*Sesuvium portulacastrum*	10	10	5	1	8	V	1-10
Sea aster	*Tripolium pannonicum*	0	0	6	1	2	III	0-6

Species list		**Domin**					**Total**	
Grass-leaved orache	*Atriplex littoralis*	0	0	0	1	0	I	0-1
Spear-leaved orache	*Atriplex prostrata*	0	0	4	4	5	III	0-5
Bare substrate								
Intertidal mud								

Source: Mott MacDonald, 2025

Table B.3: South bank stand 1 - SM13 *Puccinellia maritima* salt-marsh community *Puccinellietum maritimae*. Subcommunity 'a' with *Puccinellia maritima* dominant

Species list		**Domin**					**Total**	
Common name	**Scientific name**	**Quadrat 1: SD 91333 97855**	**Quadrat 2: SD 91339 97867**	**Quadrat 3: SD 91339 97873**	**Quadrat 4: SD 91348 97873**	**Quadrat 5: SD 91348 97879**	**Frequency**	**Range**
Grasses								
Common saltmarsh-grass	*Puccinellia maritima*	10	10	10	7	9	V	7-10
Common couch grass	*Elytrigia repens*	0	0	0	2	4	II	0-4
Creeping bent	*Agrostis stolonifera*	0	6	0	0	0	I	0-6
Forbs								
Annual seablite	*Suaeda maritima*	0	0	0	3	0	I	0-3
Spear-leaved orache	*Atriplex prostrata*	4	4	0	4	3	IV	0-4
Sea aster	*Tripolium pannonicum*	0	1	0	4	0	III	0-4
Bare substrate								
Intertidal mud		4	4	0	4	3	IV	0-4

Source: Mott MacDonald, 2025

C. Site photographs

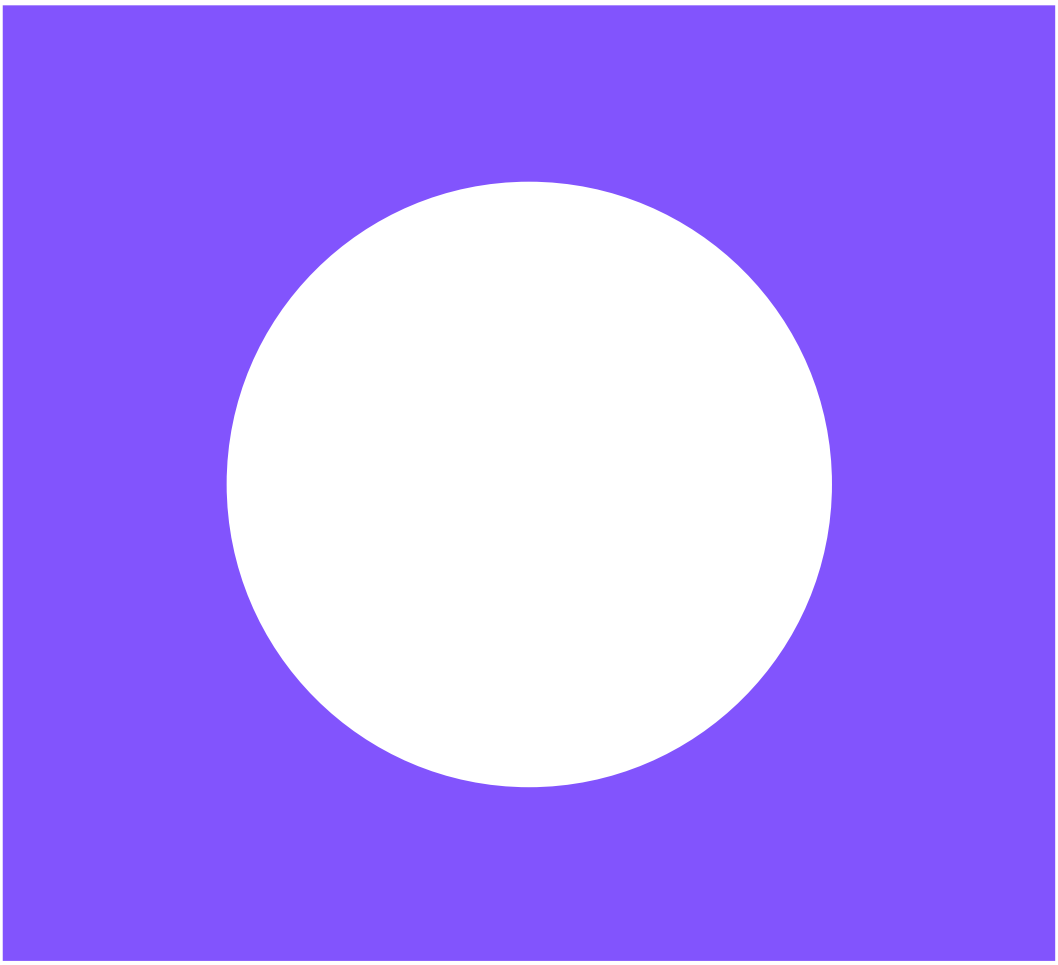
Photo reference	Description	Photograph
North bank - Stand 1 Overview	No NVC community assigned	
North bank - Stand 1 Quadrat 1	No NVC community assigned	
North bank - Stand 1 Quadrat 2	No NVC community assigned	
North bank - Stand 1 Quadrat 3	No NVC community assigned	
North bank - Stand 1 Quadrat 4	No NVC community assigned	

Photo reference	Description	Photograph
North bank - Stand 1 Quadrat 5	No NVC community assigned	
North bank - Stand 2 Overview	No NVC community assigned	
North bank - Stand 2 Quadrat 1	No NVC community assigned	
North bank - Stand 2 Quadrat 2	No NVC community assigned	
North bank - Stand 2 Quadrat 3	No NVC community assigned	

Photo reference	Description	Photograph
North bank - Stand 2 Quadrat 4	No NVC community assigned	
North bank - Stand 2 Quadrat 5	No NVC community assigned	
South bank – Stand 1 Overview	NVC SM13a community	
South bank – Stand 1 Quadrat 1	NVC SM13a community	
South bank – Stand 1 Quadrat 2	NVC SM13a community	

Photo reference	Description	Photograph
South bank – Stand 1 Quadrat 3	NVC SM13a community	
South bank – Stand 1 Quadrat 4	NVC SM13a community	
South bank – Stand 1 Quadrat 5	NVC SM13a community	

Source: Mott MacDonald, 2025



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Technical Note

Project:	A494 River Dee Bridge Replacement		
Our reference:	100395318	**Date:**	1 April 2025
Prepared by:	Jian Leow	**Checked and approved by:**	Stuart Dyne
Subject:	A494 River Dee Bridge Replacement Underwater Noise Assessment		

1 Introduction

This technical note provides an assessment to understand the underwater noise impacts from the construction of the A494 River Dee Bridge Replacement Scheme. This technical note establishes the distances where Auditory Injury (AUD INJ) /Permanent Threshold Shift (PTS), and Temporary Threshold Shift (TTS) are expected to arise from piling works. The results from this technical note will be used to inform the significance of effects on marine animals which are assessed in Chapter 16 of the Environmental Statement.

1.1 Policy context, legislation, and guidance

The legislation, policy, and technical guidance considered to be relevant to underwater noise and marine receptors are detailed in Table 1.1.

Table 1.1: Summary of legislation, policy and guidance relevant to underwater noise

Relevant legislation / policy / guidance	Relevance to assessment
Legislation	
The Environment (Wales) Act 2016	The Environment (Wales) Act 2016 sets out the requirement for the 'sustainable management of natural resources' together with new ways of working to achieve this. Potential underwater noise and vibration on relevant marine species and habitats of principle importance listed under Section 7 of the Environment (Wales) Act 2016 will be considered in this technical note.
The Wildlife and Countryside Act 1981	The Wildlife and Countryside Act, WCA is the principal mechanism for the legislative protection of wildlife in Great Britain. The WCA applies to the terrestrial environment and inshore waters (0 to 12 nautical miles) and concerns the protection of wild animals and the designation of protected areas, including Site of Special Scientific Interest (SSSIs). Potential underwater noise effects on relevant protected species under the WCA will be considered in this technical note.
National Policy	

Relevant legislation / policy / guidance	**Relevance to assessment**
Welsh National Marine Plan 2019	The Welsh National Marine Plan provides the planning framework to support proposals and license applications, as well as public authorities for decision making. Relevant policies include: ENV_05 Underwater Noise: Proposals should demonstrate that they have considered man-made noise impacts on the marine environment and, in order of preference to first avoid, minimise and lastly mitigate. If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding.
UK Marine Policy Statement (MPS) 2011	The MPS is the framework for preparing Marine Plans and taking decisions affecting the marine environment. Relevant considerations include: Noise resulting from a proposed activity or development in the marine area or in coastal and estuarine waters can have adverse effects on biodiversity. For certain animals, deliberate disturbance is prohibited and can only be carried out in accordance with the terms of a license.
Local Policy	
Flintshire Local Development Plan 2015 - 2030	Relevant policies within the local development plan include: • STR14: Climate Change and Environmental Protection …(vi) Ensuring that new development has regard to the protection of the environment in terms of air, noise and light pollution, unstable and contaminated land and former landfill sites. • EN6: Sites of Biodiversity and Geodiversity Importance …(c) Any unavoidable harm is minimised by effective mitigation to ensure that there is no reduction in the overall biodiversity value of the area. Where this is not feasible compensation measures designed to create, restore and enhance biodiversity must be provided.
Guidance and Standards	
ISO 18405:2017 “Underwater acoustics – Terminology”	Provides basic terminology and quantities for underwater acoustics.
Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise, Joint Nature Conservation Committee, *JNCC 2010*	Outlines protocol for mitigation of potential underwater noise impacts arising from pile driving during offshore wind farm construction which may be useful and applicable for pile driving in other industries in the marine environment.
Guidance for assessing the significance of noise disturbance against conservation objectives of harbour porpoise Special Areas Conservation (SACs) (England, Wales & Northern Ireland), *JNCC 2020.*	Provides the recommended study area for pin piling relevant for England, Wales and Northern Ireland which may be useful and applicable for pile driving in other industries.
Sound exposure guidelines for fishes and sea turtles, *Popper et al., 2014*	Provides permanent threshold shift, temporary threshold shift, and disturbance criteria in assessing the potential adverse impact of underwater anthropogenic noise for fish, sea turtles and larvae.
2024 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing, National Oceanic and	Provides auditory injury (including permanent threshold shift) and temporary threshold shift in assessing the potential adverse impact of underwater anthropogenic noise for marine mammals of various generalised hearing groups.

Relevant legislation / policy / guidance	Relevance to assessment
Atmospheric Administration, *NOAA 2024.*	
National Marine Fisheries Service: Summary of Marine Mammal Protection Act Acoustic Thresholds, *NMFS, 2024.*	Provides a summary of the acoustic thresholds presented in the National Oceanic and Atmospheric Administration, Technical Memorandum, 2024. Also provides the disturbance criteria in assessing the potential adverse impact of underwater anthropogenic noise for marine mammals.

1.2 Glossary

The primary underwater acoustic terminology is defined in ISO 18405:2017 and summarised in Table 1.2 alongside bioacoustics terminology for marine mammals and fish defined in NOAA 2024 and Popper *et al.* 2014 respectively.

Table 1.2 Underwater noise glossary and abbreviations

Parameter		Description	Standard reference
General			
dB	Decibel	Sound and noise levels are commonly described using the decibel scale, which is logarithmic in nature.	dB
---	Source Level	Typically described as the source level 1 m from the sound source. If unavailable, this can be calculated by knowing the measured received level at another distance from the source and estimating the transmission loss or gain over that distance.	dB re 1µPa^{2}s
---	Transmission Loss	The reduction in sound pressure level due to geometrical spreading and attenuation when the distance from a sound source increases.	---
SPL, L_p or L_{rms}	Sound Pressure Level or Root-mean-square Sound Pressure	The logarithmic measure of the root-mean-square sound pressure relative to a reference sound pressure. The reference sound pressure in water is 1µPa which is equivalent to 1 µN/m^2; while in air it is 20µPa. Typically used to characterise continuous (i.e. non-impulsive) noise and vibration.	dB re 1µPa
SEL	Sound Exposure Level	The mean square value of the acoustic pressure normalised to a period of 1s and converted to a decibel quantity.	dB re 1µPa^{2}s
SEL_{cum}	Cumulative Sound Exposure Level	The cumulative measure of energy that takes into account the received level and duration of exposure of a series of sound events. Where there are N events each with the same single strike SEL of SEL_{ss} then $SEL_{cum}=SEL_{ss}+10\log(N)$	dB re 1µPa^{2}s
SEL_{ss}	Single Strike Sound Exposure Level	It is applicable only to impulsive noise such as sound from piling. It may be calculated from the SEL_{cum} knowing how many similar strikes occurred in a measurement interval.	dB re 1µPa^{2}s
Peak SPL or L_{peak}	Peak Sound Pressure Level	The highest absolute value of the instantaneous sound pressure converted to a decibel quantity.	dB re 1µPa
Particle motion	Sound Particle Acceleration Level	The acoustic particle motion caused by the oscillatory acceleration of fluid particles in a sound field (in water). The reference particle acceleration in water is 1µm/s^2. The particle acceleration level is expressed as root-mean-squared values for continuous noise and vibration.	dB re 1µm/s^2
Bioacoustics			
---	Sound	Refer to anthropogenic sources that can either be identifiable or to distant one that cannot be located or identified.	

Parameter		Description	Standard reference
---	Behavioural hearing threshold	Threshold at which changes arise in the behaviour of animals exposed to a sound. This may include long-term changes in behaviour and distribution (e.g. moving from preferred sites for feeding and reproduction or alteration of migration patterns). It does not include effects on single animals, or where animals become habituated to the stimuli, or small changes in behaviour (e.g. startle response or small movements).	
---	Hearing threshold shift	Change in hearing threshold.	
AUD INJ	Auditory Injury	Damage to inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy which may or may not result in a permanent threshold shift.	
PTS	Permanent Threshold Shift	Level at which hearing loss arises in marine fauna and is permanent. Reduced hearing fidelity may impact the ability to communicate and ability to detect predators and prey.	
TTS	Temporary Threshold Shift	Short or long term changes in hearing sensitivity that may or may not reduce fitness. Within Popper A.N. *et al.* (2014) is also defined as any change in hearing of 6dB or greater that persists.	
---	Barotrauma	Result of rapid pressure changes that produce tissue injury.	
---	Recoverable injury	Injuries, including hair cell damage, minor internal or external hematoma (etc.). None of these injuries are likely to result in mortality.	
M&PMI	Mortality and potential mortal injury	Immediate or delayed death.	

Source: modified from ISO 18405:2017, NOAA 2024 and Popper *et al.* 2014.

2 Methodology

2.1 Supporting literature overview

Popper et al. 2014 establishes broadly applicable sound exposure guidelines for fish subject to anthropogenic noise. The guidelines consider noise impacts on behavioural changes, injuries, and mortality of various categories of fish.

NOAA 2024 provides the noise exposure criteria for marine mammals. The technical guidance assigns marine mammals to different generalised hearing groups based upon their hearing range and sensitivity and provides acoustic thresholds to assess auditory impacts. A summary of these acoustic thresholds are also found in *NMFS 2024* which also provides the disturbance criteria in assessing the potential adverse impact of underwater anthropogenic noise for marine mammals.

These references lay out the acoustic thresholds for marine species subjected to anthropogenic noise. The acoustic thresholds introduced are Temporary Threshold Shift (TTS), Permanent Threshold Shift (PTS), Auditory Injury (AUD INJ) and behavioural disturbance.

TTS is a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above an established reference level while PTS results in a permanent, irreversible increase in the threshold of audibility.

AUD INJ is the damage to the inner ear of a marine animal which can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy. Hence, AUD INJ includes but is not limited to PTS as AUD INJ may or may not result PTS.

Behavioural disturbance relates to substantial change in behaviour for animals exposed to a sound. This may include long-term changes in behaviour and distribution, such as moving from preferred sites for feeding and reproduction, or alteration of migration patterns.

2.2 Non-impulsive and impulsive noise source

Underwater noise sources are typically categorised into two types: non-impulsive and impulsive noise sources. Non-impulsive noise sources are characterised by prolonged, continuous or intermittent noise sources that do not have rapid rise and decay of sound pressure levels (i.e., dredging, shipping noise) while impulsive noise sources are characterised by transient, brief and rapid rise and decay of sound pressure levels (i.e., impact piling, explosives).

For non-impulsive noise sources, the acoustic pressure of underwater noise over a specified duration can be expressed as the square root of the average of the square of it. This is known as the root-mean-square (rms) pressure which when converted to sound pressure level is the L_{rms} with a reference pressure of 1µPa.

Criteria also involve the sound exposure level, SEL, that is used to characterise the PTS and TTS thresholds for marine mammals and fish. The SEL is the mean square value of the acoustic pressure normalised to a period of 1 second, converted to dB re 1µPa^{2}s.

For impulsive noise sources, the sound exposure level from a single impulse is defined as the single strike sound exposure level SEL_{SS}. The combined energy of multiple impulses over a specified duration is known as the cumulative sound exposure level, SEL_{cum}. (National Oceanic and Atmospheric Administration, 2024) recommends assessing SEL_{cum} over 24-hour duration. Hence, the SEL_{cum} of an impact piling activity will be the combined energy of the total number of pile strikes over a 24-hour period.

The peak sound pressure level, L_{Peak} is defined as the instantaneous peak sound pressure level of an impulse and is associated with the risk of harm due a high instantaneous sound pressure level even if the duration is short. Hence, the dual metrics, SEL_{cum} and L_{Peak} are used when assessing noise exposure in comparison with the PTS and TTS criteria for impulsive noise.

Noise sources from concurrent works should be assessed depending on the type of source (impulsive or non-impulsive) as criteria and units for impulsive and non-impulsive noise sources are not interchangeable. This means impulsive noise sources can only be cumulatively assessed with other impulsive noise and vice versa.

2.3 Summary of marine acoustic thresholds

Different marine mammal species have different frequency-specific hearing sensitivity, and this influences how each species perceive underwater noise. However, broad marine mammal hearing groups, each containing many species that still have some expected differences among them have been established to predict the effects of noise exposure. Within these groupings, group-specific weighting functions were developed, with the shape of the weighting function acting as a band pass filter that attenuates low and high frequency components depending on the hearing range of the marine mammal species.

The acoustic criteria specified may be weighted or unweighted. A weighted acoustic threshold level has been adjusted against the weighting function of each hearing group where appropriate.

Table 2.1 summarises the AUD INJ/PTS, TTS and behaviour disturbance acoustic thresholds to be used for the underwater noise assessment. The SEL levels expressed in Table 2.1 are unweighted levels for fish and weighted for marine mammals to account for the marine mammal auditory function. High peak sound pressure levels do not strictly reflect the hearing sensitivity and frequency range of each hearing groups. Hence, the L_{Peak} criteria is considered unweighted within the generalised hearing range of the marine mammals and fish.

As existing research on fish are limited, literature recommends a subjective approach for non-impulsive sound in which relative risk of effect is placed in order of rank at three distances from source – near (N, for tens of metres), intermediate (I, for hundreds of metres) and far (F, for thousands of metres). The relative risk of effect is then rated as ‘high’, ‘moderate’, and ‘low’ with respect to source distance and fish hearing type (Popper, et al., 2014).

Table 2.1: Summary of marine acoustic thresholds from NOAA 2024 and Popper et al., 2014

		Continuous sound			**Impulsive sound**				
		SEL (dB re 1µPa²s)		**rms (dB re 1µPa)**	**SEL_{cum} (dB re 1µPa²s)**			**Peak SPL (dB re 1µPa)**	
Hearing group/ Animal types	**Weighting**	**PTS**	**TTS**	**Behavioural Disturbance**	**PTS**	**TTS**	**Behavioural Disturbance**	**PTS**	**TTS**
Fish									
No swim bladder (particle motion detection)	None	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low	>219	>>186	(N) High (I) Moderate (F) Low	>213	---
Swim bladder is not involved in hearing (particle motion detection)	None	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low	210	>186	(N) High (I) Moderate (F) Low	>207	---
Swim bladder is involved in hearing (primarily pressure detection)	None	(N) Low (I) Low (F) Low	L_{rms} 158 dB re 1µPa, for 12h	(N) High (I) Moderate (F) Low	207	186	(N) High (I) High (F) Moderate	>207	---
Eggs and larvae	None	(N) Low	(N) Low	(N) Moderate	>210	(N) Moderate	(N) Moderate	>207	---

Hearing group/ Animal types	Weighting	Continuous sound			Impulsive sound				
		SEL (dB re 1µPa²s)		rms (dB re 1µPa)	SEL_{cum} (dB re 1µPa²s)			Peak SPL (dB re 1µPa)	
		PTS	TTS	Behavioural Disturbance	PTS	TTS	Behavioural Disturbance	PTS	TTS
		(I) Low (F) Low	(I) Low (F) Low	(I) Moderate (F) Low		(I) Low (F) Low	(I) Low (F) Low		
Marine mammals									
Low-frequency cetaceans (LF)	LF	197	177	120	183	168	163	222	216
High-frequency cetaceans (HF)	HF	201	181	120	193	178	173	230	224
Very high-frequency cetaceans (VHF)	VHF	181	161	120	159	144	139	202	196
Sirenians (SI)	SI	200	180	120	186	171	---	225	219
Phocid carnivores in water (PCW)	PCW	195	175	120	183	168	163	223	217
Other marine carnivores in water (OCW)	OCW	199	179	120	185	170	165	230	224

2.4 Sound propagation in water

Conventionally levels are expressed as SL-TL where SL is the source level which is the level that would be obtained at 1m from the (conceptual) acoustic centre of the source and TL is the transmission loss associated with the reduction in noise level from the nominal 1m to the measurement or prediction location. The TL model is potentially very complex with dependency on many factors such as water depth, bottom type, surface roughness, water temperature (and particularly variation as a function of depth), salinity etc. All of these factors are potentially also frequency dependent.

The simplified model of TL=βlog(r)+ αr is widely used for underwater noise assessments where the coefficient of the log term, β corresponds to attenuation by spreading while the α term corresponds to saltwater absorption. The β term has a value of 10 for cylindrical spreading, which is most applicable in shallow/confined waters where sound is reflected, and 20 for spherical spreading, which is most applicable in deep/unconfined waters where sound can propagate unobstructed. An intermediate “practical spreading” value of 15 is applicable where the environment contains elements of both, is widely used for intermediate or spatially varying conditions when actual values for transmission loss are unknown and is recommended by the NOAA.

As site specific information on transmission loss is not available, this assessment assumes a transmission loss coefficient, β, of 15 to account for the shallow water conditions of a riverbed for a conservative approach.

3 Baseline conditions

3.1 Study area

The construction activity likely to have the greatest impact on underwater noise and vibration is anticipated to be rotary bored piling during construction phase. The study area will comprise of a 15 km buffer distance from the site boundary based on the effective deterrent ranges for pin piling laid out in Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (JNCC, 2020). It is anticipated that no underwater noise and vibration adverse effects will arise at distances greater than 15 km from the Site Boundary.

3.2 Marine receptors

The identified marine receptors present within the study area is summarised in Table 3.1 according to their respective hearing groups.

Table 3.1: Marine species identified in the study area

Hearing group	Species
Fish	
No swim bladder (particle motion detection)	Sea lamprey (*Petromyzon marinus)* River lamprey (*Lampetra fluviatilis*)
Swim bladder is not involved in hearing (particle motion detection)	Allis shad (*Alosa alosa*) Herring (*Clupea harengus*)
Swim bladder is involved in hearing (primarily pressure detection)	Atlantic salmon (*Salmo salar*) Brown / sea trout (*Salmo trutta*) European smelt (*Osmeridae*) Bullhead (*Cottus gobio*)[1] European eel (*Anguilla anguilla*) Juvenile flounder (*Pleuronectes flesus)*[2] Flatfish (*Pleuronectidae*)

Hearing group	Species
Eggs and larvae	
Marine mammals	
Phocid carnivores in water (PCW)	Grey seal (*Halichoerus grypus*)

[1] Located above the tidal limit at Chester weir 11km upstream of the Scheme.
[2] Located in Queensferry drain.

4 Assessment

4.1 Construction work overview

During mobilisation, a temporary crane platform and pier will be built at the eastern river bank to enable jack-up barge to be mobilized. The temporary pier will also allow cranes and plat to transfer from land to the jack-up barge. The temporary pier will have up to 6 x 600mm diameter steel tubes vibrated into the riverbank to support a structural steel deck above.

The replacement bridge will be supported by two river piers, each constructed with 12 foundation piles, totalling to 24 x 1.5m diameter piles. After the jack-up barge is mobilised to the bridge pier location, steel casing tubes will be inserted to a depth of approximately 13m below the riverbed. The tubes will be lifted from a floating support barge by crane, lowered vertically into position and then driven in with a vibratory hammer. A rotary bore mounted on the piling rig will be used to remove riverbed silt and underlying glacial till deposits from inside the steel casing tubes. The arisings from the rotary bore will be captured and removed to land to minimise any loss of material into the river. Drilling fluid such as polymer or bentonite will be used to stabilise the ground. The steel casing tubes will then be filled with concrete to form piles, pumping off the displaced drilling fluid for recycling. It is anticipated that the piles will be installed in groups of four, and the jack-up barge will be moved slightly for each group to maintain an even spread of load from cranes on the deck of the barge. Temporary form-work or precast concrete caisson will be installed at the top of piles above riverbed level to construct a continuous pile cap and piers.

As the tubular casing will be driven through a vibratory hammer for the temporary pier and river pier installation, the noise source is non-impulsive and continuous in nature. Underwater noise levels produced through piling should therefore be assessed against the PTS/AUD INJ, TTS, and behavioural disturbance acoustic thresholds for continuous noise in Table 2.1.

The rotary bored piling also requires extraction of sediments within the steel casing tubes through a rotary bore mounted on the piling rig. This noise source is non-impulsive and continuous in nature and should be assessed with the same acoustic thresholds as the vibropiling.

The construction hours are anticipated to be from h07:30 to h19:30 and last up to 12 months. Given the piling methodology requires some downtime to reposition jack-up barge, pumping of concrete and repositioning of steel casing tubes, a conservative estimate on-time for noise produced through piling is anticipated to be 60%. This equates to 7.2 hours over a 12 hour construction day.

4.2 Source levels

The source levels used for vibropiling are based on Mott MacDonald's in-house underwater noise measurements. These measurements were taken during vibratory piling at a riverbed, with measurement locations ranging from 25 to 150 m upstream and downstream of the piling location. It is expected that the noise levels derived from these in-house measurements will provide an appropriate estimate of the underwater noise levels generated by the Scheme, due to the similar construction conditions.

The source levels for the rotary bored is taken from geotechnical drilling[1]. The noise source is similar to geotechnical drilling where a core is drilled and extracted from the seafloor for examination.

Table 4.1: Construction information and predicted source levels

Construction Activity	Working hours	% on-time	Plant and pile type	Source type	L_{rms} at 1m (dB re 1µPa)*	SEL_{24hr} at 1m (dB re 1µPa^{2}s)*
Tubular piling for steel casing installation (for temporary pier and river pier construction)	h0730 to h1930	60% (7.2h/day)	Vibratory hammer, 600mm and 1.5m diameter steel casing tubes	Continuous	152	196
Rotary bored piling for sediment removal	h0730 to h1930	60% (7.2h/day)	Rotary bore attachment installed on piling rig	Continuous	145	189

*L_{rms} and SEL_{24hr} at 1m were calculated with transmission loss value of $\beta = 15$

4.3 Results

The source levels in Table 4.1 are used to assess against the acoustic thresholds for continuous noise in Table 2.1 for identified species in Table 3.1. The subsequent distances where PTS/AUD INJ, TTS, and behavioural disturbance may arise for each relevant hearing groups are summarised in Table 4.2.

Table 4.2: Predicted impact distances for relevant hearing groups

		Tubular Piling			**Rotary Bored Piling**		
Hearing group/ Animal types	**Weighting**	**PTS/AUD INJ impact distances**	**TTS impact distances**	**Behavioural Disturbance impact distances**	**PTS/AUD INJ impact distances**	**TTS impact distances**	**Behavioural Disturbance impact distances**
Fish							
No swim bladder (particle motion detection)	None	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low
Swim bladder is not involved in hearing (particle motion detection)	None	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low
Swim bladder is involved in hearing (primarily pressure detection)	None	(N) Low (I) Low (F) Low	<1m	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	<1m	(N) High (I) Moderate (F) Low

[1] Erbe, Christine & Mcpherson, Craig. (2017). Underwater noise from geotechnical drilling and standard penetration testing. The Journal of the Acoustical Society of America. 142. 10.1121/1.5003328.

		Tubular Piling			**Rotary Bored Piling**		
Eggs and larvae	None	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Moderate (F) Low
Marine mammals							
Phocid carnivores in water (PCW)	PCW	<1m	<15m	<140m	<1m	<5m	<50m

In line with *Popper et al*., 2014 the relative risk classification for continuous noise in the absence of a numerical threshold, the risk of PTS arising is described as *low* across all distances in all fish groups for both tubular and rotary bored piling.

The relative risk classification for TTS is *moderate* for tens of metres, and *low* at greater distances for fish with no swim bladders and fish with swim bladders that are not involved in hearing. The relative risk classification for TTS is *low* for eggs and larvae across all distances. For fish with swim bladders involved in hearing, the TTS impact is expected to arise at distances <1m.

The relative risk classification for behavioural disturbance is *moderate* across tens and hundreds of metres and *low* at thousands of metres for all hearing groups except for fish with swim bladders involved in hearing. Fish with swim bladders involved in hearing have a *high* risk of behavioural disturbance at tens of metres compared to other fish hearing groups.

Only one species of marine mammal was identified within the study area - grey seal (*Halichoerus grypus*) which falls under the Phocid Carnivores in Water hearing group (PCW).

For tubular piling, it is anticipated that PTS/AUD INJ may arise at distances <1m, TTS at <15m and Behavioural Disturbance at <140m. For rotary bored piling, it is anticipated that PTS/AUD INJ may arise at distances <1m, TTS at <5m and Behavioural Disturbance at <50m.

From Table 4.2, potential adverse impacts are confined to within hundreds of metres from piling location, with the least stringent threshold being behavioural disturbance for tubular piling, which carries a *moderate* risk at hundreds of metres for all fish hearing groups and <140m for grey seals.

5 Mitigation

The following site specific measures is recommended for the benefit of underwater receptors in line with JNCC 2010:

- Careful planning of the sequence of work in order to minimise the transfer of noise/vibration in the water environment and limit the use of machines in contact with it.
- A mitigation zone should be established of a pre-agreed radius around the piling site prior to any piling. This is an area in which the Marine Mammal Observer (MMO) / Passive Acoustic Monitoring (PAM) operative will monitor either visually and/or acoustically for marine mammals before piling commences. JNCC recommends that the radius of the mitigation zone should not be less than 500m from piling location.
- The mitigation zone should be monitored by MMO/PAM for an agreed period prior to the commencement of piling. JNCC 2010 recommends this monitoring duration should be a minimum of 30 minutes.
- Piling should not be commenced during periods of darkness and poor visibility as there is a greater risk of failing to detect the presence of marine mammals. Piling should not be commenced if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection.

- Where possible equipment shall be soft started over a period of 20 minutes duration, to avoid sudden noise.

6 Conclusion

This technical note has presented the underwater noise assessment associated with rotary bored piling for the construction of the A494 Dee Bridge replacement. It is anticipated that the risk behavioural disturbance for fish groups will be *moderate* at hundreds of metres for all fish groups and falls to *low* at greater distances. The risk of TTS is *moderate* at tens of meters for all fish groups and falls to *low* at greater distances. For grey seals that fall under the hearing group PCW, behavioural disturbance may arise at distances less than 140 m and TTS may arise at distances less than 15 m. For all marine animals, the risk for AUD INJ/PTS is *low* across all distances.

Llywodraeth Cymru
Welsh Government

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A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Appendices

Chapter 16: Marine Environment

Appendix D Fish Survey Data

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Tables

Figures

16. Marine Environment

Appendix D Fish trap survey results

16.1.4 Sea lamprey and river lamprey counts at Chester Weir fish trap are shown in Table D-1 and Table D-2 respectively.

Table D-1 Sea lamprey counts at Chester Weir fish trap, River Dee 1992-2024

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1992					5								5
1993					23	37	1						61
1994					2	7							9
1995		1		2	9								12
1996	1				1								2
1997						2						1	3
1998					8	2							10
1999					1	4							5
2000				3	9	16							28
2001					31	7	3						41
2002				4			1						5
2003				4	6	5							15
2004				2	23	9							34
2005					8	8							16
2006				1	31	77							109
2007				4	43	12							59
2008		1				2	1						4
2009						4							4
2010					1	4							5
2011				3	14	10	2						29
2012				3	1	1		1					6
2013					14		9						23
2014													0
2015							8						8
2016													0
2017													0
2018					5								5
2019						1							1
2020													0
2021					3								3
2022					9	1							10
2023					7								7
2024					11								11
Average	**0.0**	**0.1**	**0.0**	**0.8**	**8.0**	**6.3**	**0.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**16.1**

Source: NRW

Figure D-1 Sea lamprey monthly catch (Chester Trap 1992 – 2024)

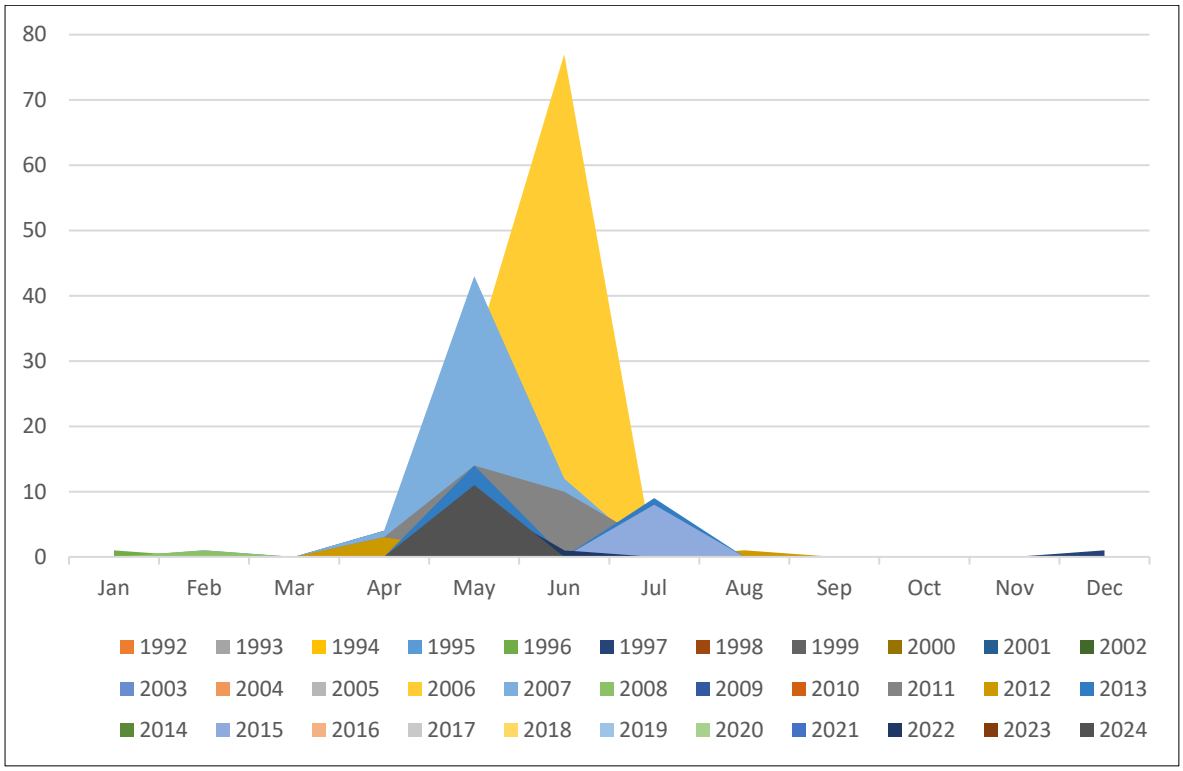

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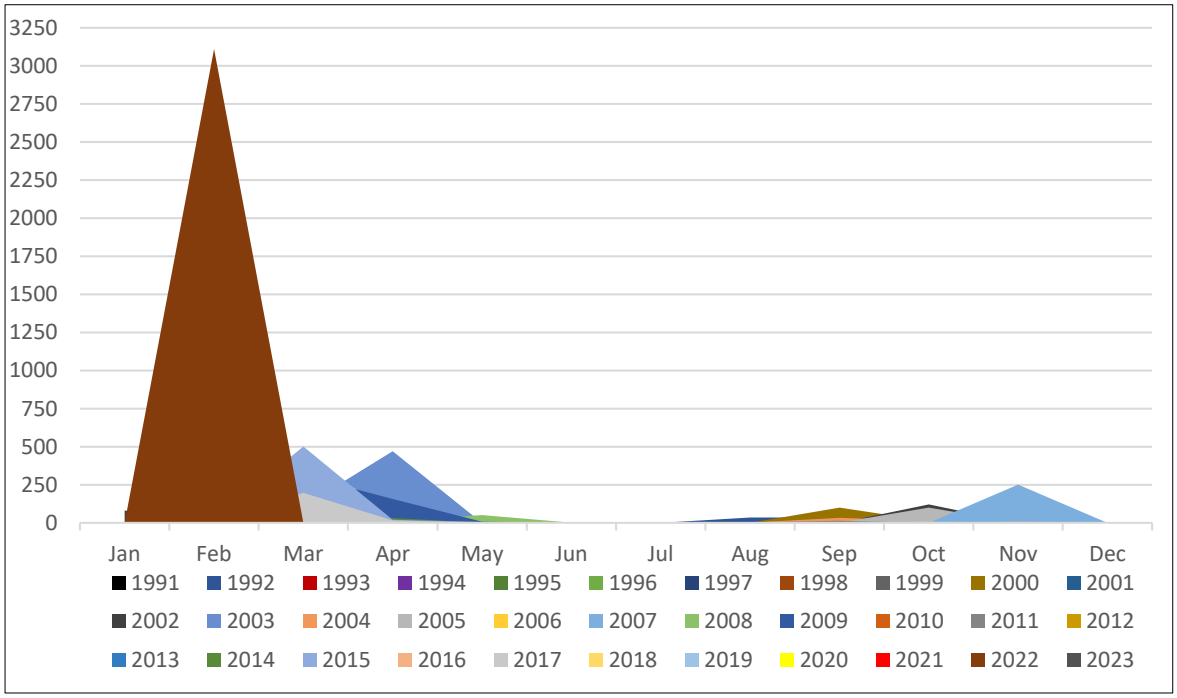
Table D-2 River lamprey counts at Chester Weir fish trap, River Dee 1992-2024

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991										100	10		110
1992		1	64		2			35	35				137
1993		4	1	105						30	30		170
1994									2	1	31		34
1995				1									1
1996										1			1
1997													0
1998										5			5
1999									1				1
2000			1			1	1		100	11		2	116
2001				4						3			7
2002	81		24							121			226
2003			108	470				1					579
2004			410		2			2	33	14			461
2005		110	400	100				1	1	100			712
2006		1	30							1			32
2007	2			1		1	2	1			251		258
2008		1	3	11	51	1		5	1	3			76
2009		7	311	156	7				4	1			486
2010				5			1		1	1			8
2011				20				3	15				38

2012				1			1	1	1				4
2013				6	1				1	4			12
2014	3			31	2				1	4	2		43
2015		23	501	20	5					1			550
2016			28				1		2		7		38
2017		2	197	16		1		6	5	8			235
2018													0
2019													0
2020								5		3			8
2021	1		1				1	1				1	5
2022		3111							1		5		3117
2023		3			1								4
2024		1											1
Average	**2.6**	**96.0**	**61.1**	**27.9**	**2.1**	**0.1**	**0.2**	**1.8**	**6.0**	**9.2**	**9.6**	**0.1**	

Source NRW

Figure D-2 River lamprey monthly catch (Chester) 1991-2023



Source NRW

16.1.5 The results of fish catches for salmon and sea trout were provided by NRW. **Error! Reference source not found.** 16.1.5Table D-3 and Table D-4 shows the monthly run estimates for catches of salmon and sea trout throughout the year.

Table D-3 Salmon counts at Chester Weir fish trap, River Dee 1991 – 2023

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991					4	17	72	290	331	214	15	11	954
1992	1	14	21	82	96	68	299	277	270	158	49	8	1343
1993	1	3	25	26	72	90	335	414	435	154	104	31	1690
1994	0	3	6	16	121	84	235	410	553	226	48	0	1702
1995	1	2	5	63	81	82	206	125	751	301	185	19	1821
1996	3	2	16	13	39	63	93	135	537	242	20	10	1173
1997	2	2	11	26	29	25	211	411	478	139	65	26	1425
1998	0	4	5	3	45	62	381	397	188	86	11	8	1190
1999	0	5	6	29	97	70	228	105	175	11	14	3	743
2000	0	2	5	2	26	43	81	271	166	7	2	5	610
2001	1	5	14	1	26	78	190	337	289	17	10	2	970
2002	0	0	4	29	39	30	185	478	286	156	2	3	1212
2003	0	2	5	22	9	113	135	241	608	182	27	7	1351
2004	0	3	4	8	78	100	167	298	457	43	24	24	1206
2005	0	3	14	5	20	132	179	545	841	92	15	13	1859
2006	0	2	3	8	42	111	84	433	695	63	21	0	1462
2007	0	1	1	17	27	20	0	387	765	154	92	12	1476
2008	0	1	1	3	94	60	77	134	198	20	13	5	606
2009	0	0	2	13	50	81	109	148	278	175	4	5	865
2010	0	3	2	6	32	40	126	266	411	106	2	11	1005
2011	1	0	5	16	26	54	104	263	153	108	55	6	791
2012	0	1	6	7	13	21	61	249	122	0	5	2	487
2013	0	0	1	1	20	37	140	324	114	23	2	2	664
2014	0	0	7	6	6	82	166	166	73	15	0	2	523
2015	0	1	0	16	25	76	193	110	53	18	1		493
2016	0	1	0	5	56	77	57	134	15	10	6	0	361
2017	0	0	1	26	84	113	207	102	11	1	0	0	545
2018	0	0	0	2	28	102	199	179	29	5	2	0	546
2019	1	0	3	12	37	14	180	62	3	0	0	0	312
2020	0	0	0		50	128	292	75	10	2	0	1	558
2021	0	0	4	12	4	124	201	126	26	9	4	1	511
2022	0	0	4	36	108	134	231	120	14	10	0	0	657
2023	**0**	**2**	**2**	**13**	**14**	**100**	**179**	**7**	**6**	**0**	**1**	**0**	**324**

Source NRW

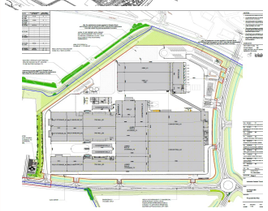
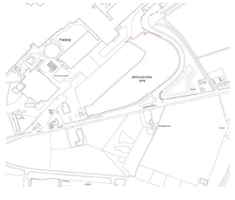
Table D-4 Sea trout counts at Chester Weir fish trap, River Dee 1991 – 2023

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991					11	153	195	93	25	96	15	0	588
1992	0	1	4	25	76	464	220	28	34	27	21	2	902
1993	0	0	0	2	29	490	500	115	40	52	51	11	1290
1994	0	0	0	2	13	445	1684	881	58	80	14	1	3178
1995	0	0	2	2	63	754	1995	364	49	61	61	3	3354
1996	0	0	2	5	12	587	1116	542	121	60	20	3	2468

1997	0	0	1	3	180	438	1119	545	59	42	35	5	2427
1998	0	0	4	1	50	691	2962	269	35	37	3	3	4055
1999	0	0	1	3	88	549	1365	234	9	22	11	3	2285
2000	0	0	0	3	103	719	633	114	10	31	0	0	1613
2001	0	0	6	7	84	667	3528	1017	16	38	8	2	5373
2002	0	0	1	7	92	682	2390	424	8	31	6	0	3641
2003	0	0	2	1	85	942	2211	246	4	14	16	0	3521
2004	0	0	1	2	20	666	2450	110	8	11	1	3	3272
2005	0	0	0	2	18	764	2602	769	13	22	2	0	4192
2006	0	0	0	1	10	874	829	755	13	16	5	0	2503
2007	0	0	0	0	46	587	94	208	14	27	15	0	991
2008	0	1	0	3	10	362	1232	26	7	5	3	0	1649
2009	0	0	1	1	47	82	439	191	2	0	0	0	763
2010	0	0	1	3	9	834	2452	128	8	11	3	0	3449
2011	0	0	0	0	191	855	895	133	7	8	8	2	2099
2012	0	0	1	0	80	585	483	303	4	2	1	1	1460
2013	0	0	0	3	3	511	3048	1129	5	13	1	0	4713
2014	0	0	0	0	20	586	4533	451	6	5	5	1	5607
2015	0	0	0	5	36	760	5417	212	5	8	6		6449
2016	0	0	0	1	22	542	1471	559	3	7	11	2	2618
2017	0	0	0	0	29	327	1860	138	7	2	2	0	2365
2018	0	0	0	0	2	373	1707	1072	14	3	1	0	3172
2019	0	0	0	1	54	126	2206	166	2	1	0	0	2556
2020	0	0	0		35	676	1419	204	5	16	2	0	2357
2021	0	0	0	0	13	622	1553	563	3	5	0	0	2759
2022	0	0	0	0	118	470	751	178	3	8	0	0	1528
2023	**0**	**0**	**1**	**0**	**36**	**324**	**1571**	**49**	**1**	**0**	**0**	**0**	**1982**

Source NRW

CEA DEE BRIDGE FOR 'OTHER DEVELOPMENTS'
MATRIX 1 - IDENTIFICATION OF 'OTHER DEVELOPMENT ' FOR CEA DEE BRIDGE

ID	OTHER DEVELOPMENT' DETAILS Grid Ref.	PROPOSAL REFERENCE	EIA CATEGORY DEVELOPMENT	BRIEF DESCRIPTION OF LOCATION	Approximate Distance and direction from Scheme (in Kms)	BASELINE STATUS OF SITE	STATUS AS AT February 2025	TIER LEVEL (1-3 HIGHEST 1,LOWEST 3.)	STAGE 1 WITHIN SPECIIFC /ALL ZONES OF INFLUENCE
1	369744 332476	A strategic site, known as the 'Northern Gateway'. The site includes planning permissions and allocated within the Flintshire County Council Unitary Development Plan for employment led development.	EIA	The site is a major scale brownfield site, located at the former RAF Sealand location in Deeside, with a defined Deeside Enterprise Zone. The site represents an extension to the Deeside Industrial Park to the north. It is bounded to the east by the Welsh Road,.., the River Dee and its designated features to the south and further industrial developments to the west. The site comprises of relatively level land and directly adjoins the A550 AND A549. The planning permission for the site considered the potential for cumulative impacts with other developments and concluded that, of the limited range identified at that stage, that no significant issues would arise. 	1.70km	In summary, at the time of this baseline review, the principal outline permission (issued 07/01/2013) relates to the redevelopment of a strategic brownfield site for an employment led mixed use development infrastructure including flood defences and landscaping. A number of related planning conditions are approved and a commencement made with the first stage of a new road infrastructure. The site directly adjoins another site listed in this table, site reference number two, and lies within close proximity to site number twenty five. In summary, development is based on a phased approach, on a 12 year time period and at the time of this review, included a pending planning application for further approval of conditions.	On going construction work including spine roads, residential and business/light industry. Large proportion of area now in development or in use. Constructiuon likely to continue for forseeable future.	Ongoing development stages 1	The overall site lies just on the periphery of the 500 m ZOI boundary but within the 1 km -2KM ZOI boundaries i.e. Up to the limit/extent of the Noise and Vibration ZOI.
1a		63721 Airfields Delta, Welsh Road, Sealand. This site is a subset of the Northern Gateway, being a site in the north corner of the allocation.				Erection of a Paper Processing Mill to produce and manufacture tissue paper (B2, B8 use class) with ancillary B1a office space; associated servicing and infrastructure including car parking, HGV parking and vehicle and pedestrian circulation; noise mitigation features; earthworks to create development platforms; creation of drainage features including a new outfall to the River Dee; water treatment plant; and landscaping.	Flintshire Citizen Portal indicates that a decision has not yet been made. However a new building exists on the previopusly cleared site.	1	The site lies 900metres north east of the scheme and so falls outside the 500m ZoI but with the 1 to 2km ZoI. Siyte is therefore within the Landscape and Visual, Ecology, and Noise and Vibration ZoIs.
2	369357 331820	Former Corus Garden City site. Planning permission and land use allocation for employment-led mixed-use development.	EIA		1.6	Planning permission approved for mixed- employment led uses along with a number of infrastructure works. Planning permission (code O501250) for employment-led mixed-use development, incorporating Logistics and Technology Park (B1,B2,B8) with residential(C3),local retail centre (A1),hotel(C1),training and skills centre(C2,D1),new parkland; conversion of buildings, demolition of barns; and associated infrastructure comprising construction of accesses,roads,footpaths/ cycle paths, earthworks and flood mitigation/drainage works, with a number of planning conditions.	A range of planning applications approved and these include the following: 060171 - for the approval of details reserved by condition no.39 (Site Investigation) attached to planning permission ref. 056540. Partially approved (Oct 2019). 060197 - for for approval of details reserved by condition No. 26 (Construction Management Plan) attached to Planning Application ref:056540. Full approval (Nov 2019). 059635 - for removal of conditions 6, 8, 11 and 32 and variation ofconditions 7, 31, 36 and 44 following grant of planning permission. (056540). Full approval (June 2020). 063721 - for the erection of a Paper Processing Mill to produce and manufacture tissue paper with ancillary office space; associated servicing and infrastructure including car parking, HGV parking and vehicle and pedestrian circulation; noise mitigation. This permission straddles part of this site. 064253 - Non-material amendment to planning permission ref. 062409 to vary the wording of condition 1 (approved plans list). Full approval (August 2022). 062409 - for approval of reserved matters for proposed enabling and infrastructure works on residential phases 1b, 2 and 3 following outline approval (059635). Full approval (November 2021). 062411 - for approval of details reserved by condition no's 13 (Landscape) and 31 (Traffic Calming, Signing, Surface Water Drainage, Street Lighting, Internal Estate Roads) attached to Planning Permission reference 059635. Full approval (September 2021).	Ongoing development stages 1	The overall site lies just on the periphery of the 500 m ZOI boundary but within the 1 km ZOI boundary i.e. up to the limit/extent of the Noise and Vibration ZOI..
3	362611 332547	Warren Hall Business Park. Existing UDP allocation for Employment use with planning history for development.			6.15	Published reports suggests doubts on site deliverability. Outline planning permission of a B1 Business Park (with various reserved matters consent for landscaping and access) granted in 2008 under code 038744, for 76,394 square metre business park (Class B1), hotel and associated leisure facilities, roadway, car parking, drainage and landscaping, and off-site roadworks including new slip roads from A55	No recent change in planning history identified on Flintshire mapping portal. Check status of site in forthcoming Flintshire Local Development Plan. Site identified as a *Strategic Site* (Policy STR3).	To be clarified as part of the Deposit LDP 3	The sites lies within the 30 km ZOI for Nature Conservation
4	364397 335251	Chester Aerospace Park, Broughton. The site includes planning permissions and allocated within the Flintshire County Council Unitary Development Plan for employment led development.			6.78	Planning permission code 057898 issued 12/03/2018 for the erection of an Advanced Manufacturing and Research Faciilty.Pending approval of details submitted to the LPA.	Constructed. And in operation	Commence to imminent 1	Site lies within the 5 km ZOI : Landscape and Visual Effects

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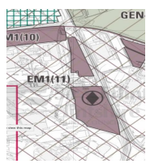
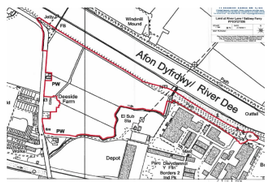
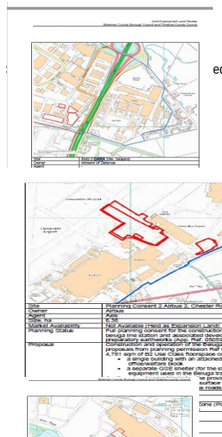
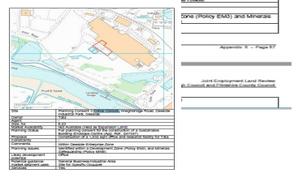
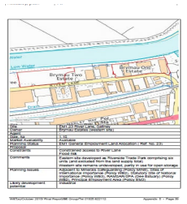
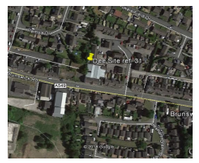
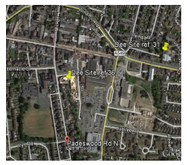
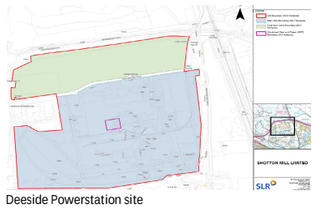
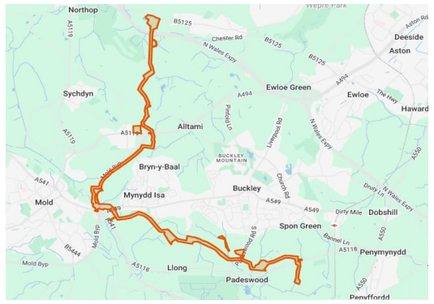
5	333465 364496	Manor Lane, Hawarden Park extension, Broughton. The site includes planning permissions and allocated within the Flintshire County Council Unitary Development Plan for general employment development,EM1.2			6.4	Planning application to extend time period for reserved details required for outline code 40732 issued on the 28/05/2018 under code 050673. Outline covers: Extension to existing business park for employment purposes to include B1, B2 and B8 uses	A range of planning applications approved and these include the following: 062483 - erection of three commercial buildings (B1 Business (Light Industrial), B2 Business Uses and B8 Storage and Distribution Uses) together with the construction of an access road and parking, a pump house, substation, installation of associated infrastructure. Approved (December 2021). 063946 - for the approval of details reserved by condition nos. 3, 16, 18, 19 and 20 attached to planning permission ref. 062483. Partially approved (June 2022). Current aerial imagery indicates that north and west portions are developed but southern portion remains undeveloped.	Unlikely to include short term commencement, confirmed by LPA	1	Site lies within the 5 km ZOI which includes the Landscape and Visual Effect limit.
6	328760 370432	Former Power Station, Connah's Quay. Site allocated for development and as an area of search for New Waste Management facilities			4.4	Planning permission for converter station comprising a maximum 3no. building units housing specialist electrical equipment and associated works refused: The proposed development close to residential development would, due to its noise and visual impacts, be potentially detrimental to the residential/visual amenities of the area. The proposal would be contrary to planning policies STR7, GEN1, EM1, EM7 and CF7 and advice as contained within Planning Policy Wales 2011 on the 17th February 2012 code reference 049136	No recent change in planning history identified on Flintshire mapping portal. Check status of site in forthcoming Flintshire Local Development Plan. Site identified as a *Possible Waste Management Site* (Policy EN21).	2	Site lies within the 5 kmZOI and therefore within the following: Landscape and Visual Effects
7	329730 369699	Crump's Yard, Dock Road, Connah's Quay. Site allocated in the UDP.	Two Screening Opinions. One for Welsh Water twin pipelines issued for part of the site (https://digital.flintshire.gov.uk/FCC_Planning/Home/NewDocView/1388720) and a separate one for a Solar Farm		2.8	Allocated in the UDP as potential area for waste management facilities. Recent permission for extension to w workshop AND proposal Screening for WW pipelines, with a separate Solar Farm proposal by FCC	Solar farm approved and constructed (application reference 060765). 061812 - non-material amendment for reallocation of substation. Approved (November 2020). No application for planning permission for WW pipelines.	1 and 2 for WW pipes	Site lies within the 5 km ZOI and therefore within the following: Landscape and Visual Effects
8	330368 371867	Land to the north of Shotton Paper, Deeside. Alloacted within the UDP as General Employment land, within a Development Zone.			3.9 km north west	South east corner part of cable route permission for an existing Solar Farm, with no speciifc planning permission history identified (at the time). Part of larger application site (FUL/000011/22), for redevelopment and expansion of former UPM Shotton Paper Mill site comprising 82 hectares of new paper factory buildings and processing plant and associated landscaping, offices, access and parking. Pending. 	Plot in construction stage possibly serving a s a construction and materials store for adjacent development. Planning application submitted June 2024 for new buildings to extend paper mill facitlities for tissue machine. Permission granted to be completed withion 5 years. Issued Nov 2024	2	Site lies within the 5 kmZOI which represenst the limit for Landscape and Visual Effects.
9	332292 371124	Land EAST Of Shotton Paper, Deeside. Allocated withi the UDP, within a Development zone for employment and southern site identified as an Area of search for new waste management facility, with central portion undeveloped.	Scoping Opinion issued under 052029 in 2014. No CEA issues identified in the Scoping or Final EIA Statement for the ERF. Separate EIA for the Waste Management Facility - no CEA identified.		2.6 KM north west	Planning permission issued for ERF IN 2015, with a number of amendments and conditioned approved. Separate planning permission for waste management facility granted in 2018 under code 058270 on the 09/08/2018	Northern and southern portions constructed as waste to energy facility (Parc Adfer) and high-voltage direct current converter station, based on available aerial imagery. 058270 - for construction and operation of a waste management facility for the management of municipal, commercial and industrial waste, comprising: a waste reception hall with ground level pit tipping area, sorting hall with associated equipment for separation. Approved (October 2018). Approval of conditions subsequently issued.	1	Site lies within the 5 kmZOI Landscape and Visual Effects
10 & 10	332247 367855	Land off Ffordd Pentre, Sandycroft. Land allocation for Employment use indicated and Quuensferry Industrial Estate			0.70 km south east -main part closest to the site, second part 0.70 further to the east and separated by the railway line.	Located on an existing Industrial Estate. Planning permission refused on the 01/11/2018 for provision of self storage units under code 058938. Chester Road East site with permission for Anaerobic Digester, with 500 Kw capacity. Cconditions submitted for LPA to determine. Code for main planning permission (050249), in 2013. 2016 imagery indicates permission for a storage facility issued in 2016 052610 and 2018 imagery indicates built, with attenuation pond on site.	Site 10 received planning permission for construction of storage units, under code number 058938 in 2019 and subsequently constructed/operational. Site 10 A remains with pending planning application, code 053712, for approval of details in connection with planning pernission code 050249 for the construction of an anaerobic digestion plant.	1	Site lies within and near the 500 ZOI, which includes all specialist topics with the exceptiopn of community and priavte assets and materials.
11	320259 377526	Greenfield Business Park - 4 Extension phases. Land allocated I the UDP as one of the largest Principal Employment Area, with planning history.			15 km to the north west	Planning permission issued in 2015 at Park 2 for the construction and operation of a waste handling depot including the erection of a portal framed building for the bulking up and transfer of domestic waste, kerbside recyclable material and food waste, new internal access tracks, a storage area for the bulking under code reference 53852. Amendments to approved permission issued in 2016. Approval of conditional details issued in 2017. Erection of wind turbine (78m to tip) issued in 2017. Pending application for Kingspan for a new fire test facility on vacant land under code 058226. 2016 imagery indicates waste handling permission implemented.	No change	1	Sites lies within one ZOI - Nature Conservation

	316280 380380	Adjacent Mostyn Docks. UDP land allocation and planning permission		19 km to the north west	Permission granted for CHP in 2014. 2018 available aerial imagery indicates no new build on the site.			
12						Available information suggests no change in status.	2	Sites lies within one ZOI - Nature Conservation
	337010 365504	Land east of Saltney Ferry Road, Saltney. Allocated within the UDP for industrial use, with planning history.		5.4 to the south east	Outline planning permission re- issued for 2014 for 3 years, under code reference 052787. L		LPA confirmed pp has expired.	
13						Current status site remains undeveloped. Under Flintshire LDP the area is unallocated and outside of Saltney development boundary.	3	Sites lies within one ZOI - Nature Conservation
	333817 370159	Dara site, Sealand. Allocated within the UDP Development Zone, policy EM 3 (site EM2) , indicates as High Quality Site Allocation.	 ed for re- use.	2km north east	No recent planning permission for any alternative uses/new build. The site (18.50ha) comrrises of former RAF cimplex, with former military buildings on site. Available information indicates some existing industrail function taking place at the site, but details need updating.			
14						Current status, pending application for screening opinion request for redevelopment of fomer sports field site pending (ref SCR/000406/22) All of sites appear developed with industrial/business units, yards and parking.	2	Site lies within the Landscape and Visual Effects
	335049 364892	Airbus site, Broughton. Allocated in the UDP Development Zone (Poicy EM3), with planning history.		5.74 south East	Based on available imagery details, planning permssions- codes 050157 and 050597 - for the site completed.			
15						No change	1	Site lies within the Landscape and Visual Effects
	330695 370032	Corus Colours, Weighbridge Road, Deeside Industrial Park. Allocated within the UDP Development Zone		2.5km north west	Planning application code 047347 implemented for the site			
16						No change	1	Site lies within the Landscape and Visual Effects zone
	328817 364818	Globe Way, Buckley. Allocated within the UDP as EM1 General Employment Land (No3.)		7km south west	Planning permission granted code 57726 in 2018 for offices, workshops etc , with pre- commencement conditions under consideration (December 2018)			
17						Aerial imagery and Ordnance Survey mapping shows that site has been developed.	3	Site lies within the Landscape and Visual Effects
	329595 363611	Land north of Buckley Station. Allocated with the UDP as Emplyment Land Allocation		8km south west	No recent planning permission			
18						Land occupied by Dog Day Care business under planning application 061676 issued January 2021.	3	Site lies within the Landscape and Visual Effects
	329374 359936	Land off Drury New Road, Buckley. Allocated within the UDP as an EM1 General Employment Land		8km south west	No recent planning permission. Site sensitivity highlighted in the 2015 JEM Study			
19						061507 Outline application for approval in principle for residential development (up to 94 dwellings), all matters reserved except for access Status : Under Consideration. Refused 13th July 2022	1	Site lies within the Landscape and Visual Effects

20	338269	365313	River Lane Saltney. UDP land allocation as EM1 General Emplyment Land, with planning history.		7.25 south east	Planning permission refused for retention of building and a current application pending.	Appears to be in use as storage and car parking late 2024	2	Site lies within the Nature Conservation ZOI
21	333947	367067	Prince William Avenue, Sandycroft		4km south east	2014 planning permission for industrial and business buildings mostly completed on 2016 imagery .	Permission issued for smaller buildings 2018 and 2019.	2	Site lies within the Landscape and Visual
22	331195	368636	Rowley's Drive, Shotton		1.20 km south west	Planning application 058739 refused 15 October 2018 on flooding/drainage matters.	No appeal. No change.	2	Sites lies up to the limit/extent of the Noise and Vibration ZOI.
23	333622	367682	Babbage Road, Sandycroft. Allocated within Principal Employment Area within the UDP.		1.5km south east	Planning permission granted for industrial use,but no recent Confirmation regarding current status and/or if a commencement made. 2018 imagery indicates no change in development status, with no new buildings. In the absence of any commencement of works made, planning permission possibly lapsed.	No change based on aerial imagery.	3	Site lies within the ZOI's for Landscape
24	338105	366577	**Minerva Avenue, Chester West**		6.20 km south east	No change in site imagery and planning permission potentially lapsed.	Site developed according to aerial imagery.	1	Site lies only within the ZOI for Nature Conservation
25	333203	370076	Deesde Industrial Park Zone 1, defined as a principle emplyoment area (policy EM30 within the UDP, which sets the principle of B1, B2 and B8 development		2. km	Permission for four industrial units (B1,B2, B8), car parking and associated infrastructure work granted under code 059018 on the 15/01/2019. The accompanying LPA report notes that the site is is accessed off Drome Road; extends to 2.15 ha and is bounded to the north by Drome Road and the former hangars with a storage facility to the east and the A494 beyond. To the south lies a metal yard with a further two hangars to the west. The four units comprise the following: • Unit 1 - 2,329sqm • Unit 2 - 2,329sqm • Unit 3 - 2,508sqm • Unit 4 - 955sqm. The proposal is expected to generate 100 full time jobs. The site lies within a flood zone area, as defined in the WG DAM maps. Pre-commencemnet planning condiitons requires the submission of a drainage scheme and details of site remediation measures.	Site developed according to aerial imagery. Application on adjacent land for retention of new office building refused (059666 - August 2021).	1	Site lies within the ZOI's for : Nature Conservation; Landscape
26	337514	364971	Glen Industrial Estate, Saltney		7km south east	Planning permission issued for demolition of factory property and erection of 70 dwellings under code 56779, in 2017, with legal obligation. Approval of conditions issued July 2018.	LPA confirm commencement likely. Site developed according to aerial imagery.	1	Site lies only within the Nature Conservation ZOI

	32732 366524	Pinfold Lane Quarry and Stoney Beach Quarry, Alltami Depot, Alltami	EIA		8km south west	Planning permission granted (under LPA code 052364) for the use of the site as a waste management facility, a construction waste materials recycling facility, and a contaminated soils treatment facility, issued January 2018, with a number of pre-commencement conditions. The EIA included sections on the potentail fro/of cumulative impacts with a limited number of developments, notably other quarries in the locality.	Recent aerial imagery confirms active landfilling operations, no recent approval of conditions.	LPA confirmed that, to date, no conditions approved.	2	Site lies within the ZOI'Landscape
27										
	327510 363303	Land at Brook Farm, Buckley			12.50 k to the south west	Planning permission for residential development renewed under code 055278 in 2016 and includes an overall site area of 0.15 ha. Units likely to total around 16.				
28							Planning permission for residential development renewed (ref: 055278), in 2019. Renewal expired Aug 2022.		3	Site lies within the Nature Conservation ZOI
	328784 364585	Rear of Hillcrest, Mount Pleasant Road, Buckley			8 km south west	Planning permission for residential development renewed under code 055936 07/06/2018, likely number of units for 15		Requires removal of coach depot		
29							Application for approval of conditions (ref 063958), submitted Jan 2022. Various conditions subsequently approved. Aerial imagery shows that development is under construction .		1	Site lies within the ZOI's for Landscape
	326778 363644	Well Street, Buckley. UDP residential land allocation.	EIA for the smaller land.		10 km south west	Number of units round 140 for larger site . Given the potential scale of the number of units potentially for the site, the site will require a Screening and/ or full EIA application. Smaller site with permission 058932 & 040842 for 58 houses	LDP Ref HSG1(31) - large parcel EIA Screening Opinion Request for proposed residential development of up to 150 dwellings, means of access, open space, sustainable drainage infrastructure and all other associated works. Negative screening opinion issued Dec 2020. Planning application pending for 140 dwellings, code 062458 LDP Ref HSG1(32) - small parcel. Partial approval of conditions issued Mar 2022	LPA confirmed that site is being progressed with likely development. Outline application is 2021. following the submission of a formal planning application, with the involvement of a housing	2 at this stage.	Site lies within the Nature Conservation ZOI
30										
	363958 328165	Site adjacent to 61 Brunswick Road			9 km to the south west	Planning permission for flats issued in 2016, under code number 055581, with 10 number expected.				
31							Subsequent approval of conditions and pending application code, 064178 .		1	Site lies only within the Nature Conservation ZOI
	328119 369455	Highmere Drive, Connah's Quay. UDP residential land allocation, with number of units likely around 160-170			5.7 km to the south west	Planning appeal code 043873 for 185 dwellings withdrawn in 2008. LPA confirm that developer interests over a long period, no recent planning permissions		LPA confirmed site is being progressed, following the submission of a formal planning application, with the involvement of a housing association.		
32							New application pending for construction of a residential development of 141 no. dwellings and associated works (Ref FUL/000034/22, registered May 2022).		2	Site lies within the ZOI for Landscape
	329597 366666	Boar's Head Inn, Ewloe			6.10 km to the south west	Planning application under consideration for (58296) for 33 units as affordable housing, following initial outline permission in 2016. .				
33							Pen y baedd residential development constructed		1	Site lies within the ZOI for Landscape
	330228 362175	Hawarden Road, Penyffordd			9.60 km to the south east	Appeal allowed for 32 dwellings under code number 056694 and approval of some details approved 21/06/2018.		LPA confirm likely short term commencement		
34							Hawthorn Way residential development constructed		1	Site lies only within the Nature Conservation ZOI
	329722 361295	Rhos Road, Penyffordd	EIA Screening opinion for residential development under code 053411 - negative opinion.		10 km south west	Appeal allowed for 40 dwellings under code number 053656 and approval of details under consideration under 057396.				
35							Construction in advanced stage based on street imagery May 2022. Now completed.		1	Site lies within the Nature Conservation ZOI

	327894 363894	Buckley Health Centre		10km south west	Planning permission for 24 residential units (AH) under code 054151 with details approved 30/08/2017 under code 057100, along with other conditions and NM'S. PENIDING application for details confirm that development begun on the 12/03/2018			
36						Llys Hampson residential development constructed.	1	Site lies within the Nature Conservation ZOI
				20.67 km west northwest				
37		**Port of Mostyn Extension Marine Works Application to NRW** **EIA required**	Mostyn Port		work consisting of construction of a new quay wall and the reclamation of approximately 4.5ha of land behind the new sea wall. Dredging works will be required for the creation of new berths, and the deepening of existing berths and approach channel and will be required for future maintenance activities. The project requires EIA consent and is subject to the requirement for an environmental impact assessment ('EIA') under the EIA Regulations. An environmental statement has been prepared by the applicant.		1	Site lies within the Nature Conservation ZOI
		Port of Mostyn dredging		20.67 km west northwest				
38			In and to the north and west in the navigable channel to Mostyn Port		Maintenance dredging activity by means of cutter suction hopper dredger at Mostyn Harbour which will be pumped through a floating pipeline directly into the Mostyn Breakwater disposal site.		1	Site lies within the Nature Conservation ZOI
		Tidal Lagoon in Dee estuary Mostyn Dock (Mosatyn Sea Power		20.67 km west northwest				
39			Lagoon behind a wall from Port of Mostyn to Poinmt of Ayr		oposals for a tidal lagoon in the outer Dee Estuary. The design includes a 6.7 km boundary wall extending from the Port of Mostyn to the Point of Ayr at the estuary mouth. It will produce enough low-carbon electricity to power 82,000 homes in North Wales. It will create 300 jobs during the construction period as well as permanent jobs during its operational phase. It will also provide flood protection to a hinterland that includes homes and businesses as well as the A548 Coast Road and the North Wales coast railway line.		1	Site lies within the Nature Conservation ZOI
		Combined Heat and Power (CHP) at Shotton Paper Mill						
40			 Deeside Powerstation site	3km north west	Combined Heat and Power (CHP) Facility relating to redevelopment and expansion of Shotton Paper Mill. The generation capacity of the CHP Facility will be 69MWe	Status in February 2025: Inspectors Report submitted to Planning Directorate of WG 03/01/25. Planning Conditions partly discharged Nov 24	1	Site lies within the Nature Conservation ZOI
41	SCR/000851/24	**No, decision following screening request**		3.6km north west	former powerstation building	former powerstation building to be used as a Hydrogen-ready Gas Peaking Plant EIA screening opinion negative. Screenijng report from applicant suggests atmospheric nitrogen deposition would increase with impact on sensitive receptors. Certificate of Lawful use issued Dec 2024.	1	Site lies within the Nature Conservation ZOI
42	SCR/000646/24	**No, decision following screening request**	Wepre, Connah's Quay Land south of Weighbridge Road, Deeside Industrial Park, Deeside, CH5 2LL	3.8km north west	Brownfield site	EIA screening opionion issued an12th Agust 2024 for use of site for waste management facility	2	Site lies within the Nature Conservation ZOI
43	FUL/000447/24		COMPACT SYNGAS SOLUTIONS, Whittle Close, Sandycroft, Deeside, CH5 2QE	1.8km south east	Construction and operation of a small-scale biomass gasification CHP plant for research, development, testing and controlled trials	Screening Opinion issued for EIA. Permission granted with coinditions. July 2024 for Construction and operation of a small-scale biomass gasification CHP plant for research, development, testing and controlled trials. July 2024.	2	Site lies within the Nature Conservation ZOI
44			HyNet Carbon Dioxide Pipeline	800m at closest point	A new build CO2 pipeline that will transport CO2 produced and captured by future hydrogen producing facilities and existing industrial premises in North West England and North Wales for offshore storage. The CO2 pipeline will comprise both newbuild and existing pipelines (and newbuild and existing above-ground installations (AGI) to allow operation and maintenance works in relation to the pipeline, including the newbuild Proposed Flint AGI) that will be covered under the DCO. When complete it will run from the Ince AGI in Cheshire to Talacre Beach in North Wales Site at Padeswood Hynet Carbon Dioxide Spur Pipeline linear route from Heidelberg Materials Plantn (Padeswood to Northop Hall.		1	Site passes through all zones

45	SCO/000250/24	Yes	Site at Padeswood Hynet Carbon Dioxide Spur Pipeline linear route from Heidelberg Materials Plantn (Padeswood to Northop Hall.	4.4km north northeast at closest		Decision letter issued March 2025 giving go ahead for scheme. Order made 20th March. Comes into force April 2024. Construction continues until 2026 and then into operation.	1	Site lies within the Dee Bridge ZOI
46		Yes	Solar Farm at Frodsham	22km east north east		Planning appalication expected to be submitted in June 2024	2	Site lies within the Nature Conservation ZOI
47	F 058314	No? Check	Record Street Northop Flint	7.5km west	Outline planning application for 145 residential propoerties and associated works to highways.	Deciasion issued on outline application, but decision not stated on portal. Permission is indicated as expiring on the 11th March 2026, which suggests that outline permission has been given. NO EIA required???	2	Site lies within the Nature Conservation and LVIA ZOIs
48	61994	No	Land at Gwernaffield Road, Mold, Flintshire	10.3km south west	Full planning application for 235 dwellings with open space and infrastructure.	Planning application aprroved 13th Feb 2025. Full Approval once legal agreements completed.	1	Site lies within the Nature Conservation ZOI
49	EN010136	Yes	Irish Sea - 22.22km from the Isle of Man and 37.13km from the North West Coast of England		Development of an offshore wind farm with an approximate capacity of 1500MW in the Irish Sea awarded as part of the Round 4	Representations from consultees received up to March 2025. Examination Stage. Hearings on Environmental Matters February 2025. No decision made March 2024	1	Site lies beyond the limits of all ZOIs for Dee Bridge.
50	DNS/3251545	Yes	Bretton Hall, Flintshire Located 2.6km of the Airbus facility and 6km from Dee Bridge.	6km	A proposed solar farm and grid connection, supporting energy infrastructure including battery storage and associated site works incorporating partial widening of an existing access, maintenance tracks, perimeter and stock fencing, CCTV cameras and the provision of a customer cabin, outdoor classroom, and parking.	Decision awaited	2	site lies within ZOIs for Dee Bridge
51	Proposal only	Yes	 m large array on land to dge. Off Manor Road,	overlapping	A proposed solar farm and grid connection, supporting energy infrastructure.	Proposal only proposed by Renewable Connections and Detra Solar	2	site lies within all ZOIs for Dee Bridge
	WG INFRASTRUCTURE PROJECTS							
IP.A	Plan issued in September 2017 for the preferred Deeside transport corridor route: https://beta.gov.wales/sites/default/files/publications/2017-10/a55-a494-a548-northop-to-shotwick-interchange-tr111-route-protected-for-planning-purposes_0.pdf					As at February 2022, this infrastructure projects is currently being considered as part of the Welsh Government Roads Review: https://gov.wales/a55-a494-a548-flintshire-corridor-overview#section-80073	1	Lies with the Landscape ZOI

CEA DEE BRIDGE FOR 'OTHER DEVELOPMENTS'
MATRIX 1 - IDENTIFICATION OF 'OTHER DEVELOPMENT ' FOR CEA DEE BRIDGE

STAGE 2 PROGRESS TO STAGE 2?	Overlap in temporal scope	Is there potential to effect the same receptors as the Scheme	OTHER FACTORS	PROGRESS TO STAGE 3?
Y	Yes, given commencement of a phased planning permission of the site and ongoing conditional requirements.	Yes, in particular the overall scale and timescale for both sites to commence/complete construction in tandem and the implications for/on the following: road drainage and water environment; all travellers, noise and vibration; and Nature conservation.	Scale, phasing, additional infrastructure requirements and timing with other projects, including other sites, timing of LDP progress and Welsh Government t projects.	yes
N	The buildsding appears to be completed on the site from Google Earth.	Landscape and visual		No
y	Yes - given the site adjoins site 1, the proposal could give rise to similar effects	Yes	As site 1	yes
No. Site relatively distant from Scheme, with no permission in place.				No
N. Within sufficient distance from the Scheme and likely to be implemented in the short term.				No

No. Sufficient distance away from the Scheme, limited scale and no approval of details issued. If Scheme delayed, revisit the proposal to update status and extent of any changes e.g.LDP allocation policy.				No
N, at at this stage. But keep under review to consider status, given proximity to River Dee and any potential change in view from Scheme				No
Y	Possible potential for the construction of the two water pipelines and Scheme construction period	Given the potential timing of the Scheme and the location/ relationship with the site, the River Dee,together with location of another site, site 6, just over 1.5 km to the north west of his site, effects on Nature Conservation a potential effect to consider	The proposal relates to the provision of new infrastructure pipes, which includes a utiiity company (Welsh Water) who will be consulted formally as part of the Scheme's EIA process.	yes
Y	Could potentially overlap with another highway transport infrastructure Scheme which is currently in 'progress stage'. Site number 9 also in close prximity			No, at this stage
			If site to be completed in next 12 months, will be deleted from this Matrix 1 list.	
Y - if the site development not completed	Yes - similarly with sites 1 & 2, if part of the site remains undeveloped.	Remainder of site although limited in site area, includes driect links to/from Shotwick Road and the A550 junction.		No, site completed
			Site planning history needs clarity	
y	Dependent on status of planning permisions	Yes		Yes
N				

N		
N		
Y, but dependent on outcome and development timetable.	Site likely to be dependent on progression within the next LDP stage	yes
N		
N		
N		
N		
N		

N				
N				
N at this stage. Site needs monitoring to ensure up to date planning status for any development proposals. Although site relatvely small scale in size, relatively close to southern end of the Scheme, with vehicular use of the nearby B5129 highway which exits/enters with the A494 . Flood and surface water isses for the site.				
N				
N				
			Site infrastructure requirements and the relationship with Sites 1 &2	
N	Similarly with Sites 1 & 2, and other developments.	The site, singularly, could be considered to represent a a limited scale.		No
N				

N		
N		
N		
N		
N		
N		
N		
N		

CEA DEE BRIDGE FOR 'OTHER DEVELOPMENTS'
MATRIX 1 - IDENTIFICATION OF 'OTHER DEVELOPMENT ' FOR CEA DEE BRIDGE

N			
Yes	Could potentially overlap with Scheme because both have an extended lead in time.	Yes, biodiversity in the Dee Estuary and river	Yes
Yes	This is a regular activity to maintain the port with dredgings being taken for disposal in a specific location. Activity is likely to overlap with Scheme constrruction and works in river.	Yes, biodiversity in the Dee Estuary and river	Yes
Yes	This is a project that will take a considerable time to reach construction if consent in given. Unlikely to coincide with Scheme construction	Yes, biodiversity in the Dee Estuary and river	Yes
Yes	Likely to be in construction in the near future and so could overlap with Scheme construction	Part of an existing facilitiy and unlikely to generate additional significant impects	Yes
Yes	Likely to commence operation soon.	Possible air quality effects	Yes
No	No indication that the project is progressing after screening opinion issued.		
No	Likely to be in construction in the near future and so could overlap with Scheme construction. Likely to be small scale	Possible air quality effects	
Yes	Likely to be in construction in the near future and so could overlap with Scheme construction. Likely to be small scale	Yes	Yes

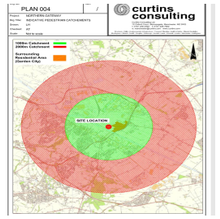
Yes	All in place to commence work of construction	No		Yes
Yes	Unlikely to commence in the next 2 to 3 years due to long process for permissions and grid connections.	No		No
Yes	Seems unlikely to proceed to construction in the next 2 to 3 years, but even if it does, the site will be developed over period of several years so that impacts will be spread over this period	No		No
Yes	Seems likely to proceed within 12 months or so, but at a considerable distance.	No		No
Yes	Could proceed in the next few years, subject to decision.	Yes	A very long way from the Scheme	No
Yes	Could proceed in the next few years, subject to decision.	No		No
Yes	We are not aware that this scheme has progressed beyond early masterplanning stage	Yes	Overlapping with scheme	Yes
Y	Related to progression of current stage.	Limited to Nature Conservation, Landscape and potential issues with planning sites identified for inclusion in Stage 2 Matrix Assessment.		Yes

Site identification			Development type - planning permission or land allocation in current adopted UDP		RELEVANT EIA DETAILS FOR THE DEVELOPMENTS , per receptor topic, with pre and post 2017 EIA topic.		
total number of sites	Site reference details location ref. on RML CEA map	Address/location	Development details The primary Planning permission ref: (link)	Description of EIA documents available	Nature Conservation Ecology & Ornithology	Road Drainage & Water Environment Hydrology & Flood Risk	landscape & Visual Effects landscape & visual impact
1	1	Northern Gateway - remainder of site and pending applications identified on the long list Matrix 1 detail.	The main EIA considerations reflected in a range of subsequent planning applications and decisions	EIA. EIA. Paragraph 2.7 refers to cumulative impacts which identifies a site at RAF Sealand (Praxis) as the only development site as part of the CEA as agreed with the LPA at the time.	2 km desk study area, with site itself with detailed studies	No specific boundary detailed in original EIA but refers to figure 5.1	Not defined, but map indicates possibly up to 5 km
2	2	Former Corus Garden City site	Similar to site 1, the main EIA considerations reflected in a range of subsequent planning applications and decisions	EIA	2km desk study area, with site itself with detailed studies	1 km and catchment wide - described in in part as 12 km squared	ZVI for 5km
3	6	Connah's Quay Low Carbon Power	Combined Cycle Gas Turbine (CCGT) Generating Plant fitted with Carbon Capture Plant (CCP) on land at, and in the vicinity of, the existing Connah's Quay Power Station (Kelsterton Road, Connah's Quay, Flintshire, CH6 5SJ), North Wales. Likely to commence construction by 2026 and operation by 2031. Then second phase commences construction in 2031.	Scoping Opinion requested and issued by Planning Inspectorate. A preliminary Environmental Assessment prepared which identifies likely effects.	There would be likely adverse effects during construction and during operation on designated sites as a result of habitat loss and changes to air quality, hydrology and water quality. After more detailed assessment these adverse effects are not expected to be significant. With mitigation there is likely to be some residual significant adverse effects on Shotton Lagoons and Reedbeds SSSI, Inner Marsh Farm SSSI and Connah's Quay SSSI. On the marine ecology, mitigation to reduce the effects of benthic habitat loss, suspended solids, airborne and waterborne pollution, should avoid significant impacts.	No significant adverse effects are expected with proposed mitigation during construction, operation and decommissioning.	With proposed mitigation there would be moderate adverse (significant) effects on views from Flint Castle, Kelsterton, Rockcliff, Connah's Quay, Kelsterton cemetery, Memorial Gardens and users of National Cycle Route 5 and PRoW.
4	7	Crump's Yard, Dock's Road, Connah's Quay Ref Nos 058694 & 059546	Installation of twin water mains by directional drilling beneath Dee Estuary Ref Number 058694 https://digital.flintshire.gov.uk/FCC_Planning/Home/Details?refno=058694 and for the solar proposal https://digital.flintshire.gov.uk/FCC_Planning/Home/Details?refno=059546	Negative Screening Opinion Water supply pipes, Separate Screening Opinion issued 06/02/2019 for solar farm at Crump's Yard			
5	8	Land to the north of Shotton Paper, Deeside	Several planning references provided in Matrix 1, and these relate to there're-development' and new 'development' stages: August 2022 planning permission for piling works at the paper machine for redevelopment and expansion of existing: October 2022 planning permission for the redevelopment and expansion of former UPM Shotton Paper Mill site comprising of 82 hectares of new paper factory buildings and processing plant;	DNS Scoping Opinion. This is limited to CEA of effects to within 2.5 km of the site, which focus on the three factors: site area if 5 ha or more; employing 110 staff or more and generating more than 20MWe.	Identifies 20km for designated birds sites, with further bird studies to be completed. FCC response letter states additional details and for potential impacts from traffic emissions on habitats within designated sites and protected species.	PEDW notes the need for an ZOI with HRA,in particular bird species and notes relationship with other topic specialists The final EIA: The study area encompasses the site of the proposed development and immediate environs. Water features identified within a 2km buffer of the site boundary have been screened and those considered to have a potential hydrological pathway to or from the site assessed.	PEDW highlighted a wider study area, which was subsequently increased to 5 km.

6	9	Land east of Shotton Paper, Deeside	Northern and southern portions constructed as waste to energy facility (Parc After) and high-voltage direct current converter station, based on available aerial imagery. 058270 - for construction and operation of a waste management facility for the management of municipal, commercial and industrial waste, comprising: a waste reception hall with ground level pit tipping area, sorting hall with associated equipment for separation. Approved (October 2018). Approval of conditions subsequently issued.	2 EIA'S for separate developments for the site. Negative EIA Screening. Development remaining?	Excluded from the EIA		Excluded from the EIA
7	10a	Land off Ffordd Pentre, Sandycroft. Anaerobic digester waste facility. Ref No. 058270	Site 10 A remains with pending planning application, code 053712, for approval of details in connection with planning permission code 050249 for the construction of an anaerobic digestion plant.	Negative Screening Opinions - Erection of a plastic reprocessing facility to reprocess plastic material into pump quality diesel and gasoline, Separate Screening Opinion for solar PV systems at Waste Water Treatment Works Factory Road, Pentre, Queensferry, Flintshire. CH5 2QJ	2 km in Screening request for the Solar proposal	FCA included	
8	37	**Port of Mostyn Extension Marine Works Application to NRW**	work consisting of construction of a new quay wall and the reclamation of approximately 4.5ha of land behind the new sea wall. Dredging works will be required for the creation of new berths, and the deepening of existing berths and approach channel and will be required for future maintenance activities.	Consent received Feb 2025. Construction planned for completion by 2027. project required EIA consent and is subject to the requirement for an environmental impact assessment ('EIA') under the EIA Regulations. An environmental statement has been prepared by the applicant.	22km north west this development is a considerable distance away, but is within the Nature Conservation ZoI of 30km. Also included at the request of NRW. EIA identifies potential changes to sediment, water quality, underwater noise and vibration during construction. The main impacts of project: Insignificant to minor adverse on benthic habitats and species, fish, shellfish, marine mammals. Minor to moderate effects on coastal waterbirds.	Insignificant changes to flood risk resulting from project	Not included
9	38	Port of Mostyn dredging In and to the north and west in the navigable channel to Mostyn Port	Maintenance dredging activity by means of cutter suction hopper dredger at Mostyn Harbour which will be pumped through a floating pipeline directly into the Mostyn Breakwater disposal site.	Marine Licence needed	As above	As above	As above
10	39	Tidal Lagoon in Dee estuary Mostyn Dock (Mostyn Sea Power	Proposals for a tidal lagoon in the outer Dee Estuary. The design includes a 6.7 km boundary wall extending from the Port of Mostyn to the Point of Ayr at the estuary mouth. It will produce enough low-carbon electricity to power 82,000 homes in North Wales. It will create 300 jobs during the construction period as well as permanent jobs during its operational phase. It will also provide flood protection to a hinterland that includes homes and businesses as well as the A548 Coast Road and the North Wales coast railway line.	Marine Licence needed. No details published since 2022 press release. NO ES available from which to identify potential impacts.			
11	40	Redevelopment and expansion of Shotton Paper Mill, & Combined Heat and Power (CHP) at Shotton Paper Mill DNS reference: 3279559	A project to redevelop the mill to process waste paper and manufacture card and packaging materials. Combined Heat and Power (CHP) Facility relating to redevelopment and expansion of Shotton Paper Mill. The generation capacity of the CHP Facility will be 69MWe. A DNS application, separate to the LPA process. A is identified under the DNS category of development by PEDW with a 'notice of intention to submit an application' submitted on the 14/09/2021.	Paper Mill permissions granted in May 2022. Details approved in April 2024. Variations of Conditions approved, latest in January 2024. Construction expected to be completed by 2026. CHP Scheme: Status in February 2025: Inspectors Report submitted to Planning Directorate of WG 03/01/25. Planning Conditions partly discharged Nov 24.	With mitigation there would be no adverse effects on Designated sites resulting from any effects on ground and surface water quality, air quality, construction noise. Significant adverse effect on open mosaic and reedbed habitat in the short term. No adverse effects on freshwater biology, invertebrates, reptiles, birds and bats.		
12	41	Hydrogen Ready Gas Plant at Deeside Power station, Weighbridge Road, Sealand	former power station building to be used as a Hydrogen-ready Gas Peaking Plant EIA screening opinion negative. Screening report from applicant suggests atmospheric nitrogen deposition would increase with impact on sensitive receptors. Low-carbon hydrogen production proposed.	Certificate of Lawful use issued Dec 2024. ES and NTS issued for Permit Variation in February 2025. Scoping report (March 2024) available in February 2025. ES awaited.	temporary disturbance impacts and permanent loss and degradation of nature conservation designations and other relevant terrestrial and aquatic habitats within site or outside where pathways exist. direct and indirect impacts on relevant protected and notable species. Temporary and long term water quality (sediment run-off) and air quality effects could adversely affect habitats and species. effects on birds including loss and degradation of habitat and disturbance. Potential effects on migratory fish during construction from noise, vibration and lighting.	Potential effects of hydrology on marine and estuarine designations are scoped into the EIA. A Flood Consequences Assessment is to consider the risks from flooding. A drainage strategy will demonstrate how surface water will be managed.	Scoping indicates that there would be temporary changes to landscape character and views during construction and decommissioning. There would be permanent long term changes during operation. Some of these effects would be significant.

13	44	HyNet Carbon Dioxide Pipeline	A new build CO2 pipeline that will transport CO2 produced and captured by future hydrogen producing facilities and existing industrial premises in North West England and North Wales for offshore storage. The CO2 pipeline will comprise both newbuild and existing pipelines (and newbuild and existing above-ground installations (AGI) to allow operation and maintenance works in relation to the pipeline, including the newbuild Proposed Flint AGI) that will be covered under the DCO. When complete it will run from the Ince AGI in Cheshire to Talacre Beach in North Wales	IEA submitted and Orders made at decision by Inspector Order came into effect in April 2024. EIA Scoping in the form of a Preliminary Environmental Information Report published 2024. Expected to commence in 2026 and continue to a second phase in 2031. May only be operational from 2031 or later.	EIA Scoping: Terrestrial and aquatic ecology: no significant adverse effects on designated sites with mitigation during construction. During operation there will be some significant adverse effects on several SACs and SSSIs as a result of operation due to air quality, hydrology and water quality effects. Marine ecology: no significant adverse effects expected with mitigation.	EIA Scoping: There could be effects on the river from outfalls and intakes, but these are not quantified in this early stage report.	EIA Scoping: Viewpoints: Significant adverse effects expected to arise for viewpoints at Flint Castle, Kelsterton and parts of Connah's Quay and National Cycleway 5 and river side PRoW. Other effects not considered to be significant.
14	45	SCO/000250/24 Heidelberg plant spur pipeline	Site at Padeswood Hynet Carbon Dioxide Spur Pipeline 10km linear route from Heidelberg Materials Plant (Padeswood to Northop Hall. Heidelberg Materials Plant (Padeswood to Northop Hall. A new build CO2 pipeline that will transport CO2 produced and captured by future hydrogen producing facilities and existing industrial premises in North West England and North Wales for offshore storage. The CO2 pipeline will comprise both newbuild and existing pipelines (and newbuild and existing above-ground installations (AGI) to allow operation and maintenance works in relation to the pipeline, including the newbuild Proposed Flint AGI) that will be covered under the DCO. When complete it will run from the Ince AGI in Cheshire to Talacre Beach in North Wales.	EIA Scoping Decision Issued May 2024	EIA Scoping: Potential construction stage effects on statutory and non-statutory designated sites, Priority Habitats, Ancient Woodland, waterbodies, Bats, Hazel dormouse, otter, water vole, other mammals, birds, great crested newts, reptiles, fish and invertebrates identified. Operational effects are not mentioned.	EIA Scoping:	EIA Scoping: Potential significant temporary and permanent visual impacts as a result of construction of Padeswood Spur, the loss of vegetation cover and trees.
15	46	Padeswood Carbon Capture and Storage (connected by spur linking to Hynet pipeline	The Padeswood Carbon Dioxide Spur Pipeline Proposed Development forms part of the wider HyNet Project and is focused on Carbon Capture and Storage (CCS). The objectives of HyNet are to reduce carbon dioxide emissions from industry and support economic growth in North Wales and the North West of England. approximately 10km in length, connecting the Heidelberg Materials (formerly known as Hanson) cement works in Padeswood (Flintshire) with the HyNet Carbon Dioxide Pipeline at the Northop Hall Above Ground Installation (AGI) in Flintshire. The route options for the pipeline are under consideration, with statutory consultations in spring 2025, planning application to be submitted the same year. Construction is planned for 2026 to 2028.	Decision letter issued March 2025 giving go ahead for scheme. Order made 20th March. Comes into force April 2024. Construction continues until 2026 and then into operation. To determine the corridor of land that could house the proposed development, a weighting exercise was conducted by topic area. The topic areas included, among others, ecology, cultural heritage, water environment and ground and soils.	The ES states that with mitigation the effects of the project on biodiversity will not be significant.		The project would result in the loss of grassland, scrub and woodland. With mitigation the effect on the local landscape would be significant adverse. There will be views from local settlement and PRoW and landscape mitigation will include new woodland in the north and north west of the site.
16	51	Sealand Manor Solar Farm	Sealand Manor Solar farm large array on land to the north east of Dee Bridge. Off Manor Road, CH5 2SB. Covering an area of approximately 91 hectares	Nothing published yet, so all comments in the column to the right are speculative based on what is known from the Dee Bridge scheme.	The fields nearest the road are covered by Dee Bridge surveys. These show that some Notable and Priority bird species may use the area for breeding and several species of birds are overwintering. Water Vole are thought to use the ditches in the area. Otherwise the land is intensively cultivated for arable crops with limited lengths of hedges.	The site lies within Flood Risk Zone 3, although the area is also a TAN 15 defended area.	

	IP sites					
16	A	Deeside Red route transport project		Will require a full EIA but project requires firmer details and timetabling. For the purposes of this CEA, a 5 km study area is indicated as this captures the minimum boundary for statutory designated nature conservation features.		

All travellers traffic & transport	Geology & Soils Land Quality	Archaeology & Cultural Heritage cultural heritage	noise & vibration noise & vibration	air quality air quality	Community and Private Assets socio - economic
route corridor for the A494 between the interchanges of the A550/A54	generally, the site itself	500m buffer around the site	site and a limited number adjoining	either end of main highway TR route, the site and to the north	proposal sits within a sub - regional context
	generally, the site itself	the site itself and listed buildings in close proximity	site and a limited number adjoining	Diffusion tubes identified at 5 km limit	development form the local to the national level
There would be the greatest impact on Kelsterton Road during construction. With mitigation there would be no likely significant adverse effects. Decommissioning would have a similar effect.		Construction effects have been identified on potentially present buried archaeological remains from the Roman period. Mitigation, including evaluation and possibly excavation would mitigate the likely destruction, resulting in a minor to moderate adverse effect. There are no known marine heritage assets that are likely to be effected. There is potentially significant effects on any discovered assets but with mitigation there would be no likely significant residual effects.	With mitigation there are generally expected to be no residual noise and vibration effects other than from construction traffic using Kelsterton Road where the impact would be moderate adverse (significant) effect. With mitigation there would be no residual significant noise and vibration effects from operation other than on Kelsterton Road where there would be a moderate to major adverse (significant) effect on three receptors at night and in the day. Decommissioning would result in similar effects as construction.	With mitigation there are no likely significant effects on human health during construction, operation and decommissioning.	With mitigation there are no anticipated significant adverse or beneficial effects.
Scoping Report refers to the proposed upgrading by WG for the nearby A548: *The current Red Route scheme encroaches into plot A4 of the development Site however a deliverable solution will be submitted with the application that avoids affecting the proposed development on the A4 land* and refers to the Transport Assessment, with no matters scoped out and sets out a future baseline for 2024. FCC response notes the need for the A548 (although under review at the time) with allowance for the construction of the a grade separated road junction with Weighbridge Road in the design layout. PEDW required consideration for construction route and access to the site. EIA Study area focused on four 'links': A548 Weighbridge Road 2 A548 (East of Flintshire Bridge) 3 A548 (West of Flintshire Bridge) 4 Shotwick Road (East of Deeside Industrial Park).	PEDW agreed to scope out mineral and agricultural resources. Final EIA study area comprised the site itself and surrounding area 1km radius. ' *The 1km zone of influence was chosen as this is the area within which it is considered that certain sources could potentially have an effect on the Site, and the Site could have an effect on off-Site receptors.'.*	PEDW required details. EIA includes the site itself and a 2 km study area.	PEDW highlighted the need for considerations for construction and operation noise and vibrations, both human population and ecological receptors and these included in the final EIA. EIA mentions cumulative noise effects could be experienced where construction activities of the nearby cumulative developments overlap, potentially increasing construction sound levels at nearby NSRs, but that developments are reliant on noise construction assessments. ...*As such, it is not anticipated that there would be significant cumulative effects associated with construction noise. Therefore, it is concluded that construction activities of adjacent cumulative developments will result in a temporary cumulative effect of slight adverse significance at most. The traffic data used for the noise assessment includes vehicle movements associated with identified committed developments in the assessment area – as documented in*	PEDW notes the need to specify a Study area. the final EIA includes a study areas for the different aspects of the assessment as follows: • *1km from the Site for construction phase dust emissions;* • *a 10km radius from the Site for consideration of point source combustion emissions;* • *200m from the A548 between Oakenholt and the A458/A494 junction for road traffic emissions..*	Scoping Opinion notes potential for cumulative effects with regards to other' prospective or consented projects at both construction and operational stage. Scoped out demand fod housing, schools and health services. EIA defines a two-tiered study area: Wider Study Area (WSA)Local Area of Influence (LAI)- this being 2 km from the site.

Excluded from the EIA but separate transport statement within planning application documents		Scoped out	The study area for the noise and vibration assessment includes land to the north of the A548 Weighbridge Road as far as the village of Burton and includes the village of Puddington to the northeast, as far as Garden City to the southeast, as far as Shotton to the south and as far as Connah's Quay to the southwest.	Owing to the different spatial extents at which likely significant effects could arise from the development different Study Areas were adopted in the assessment for the different aspects. i.e. human health and nature conservation	The assessment primarily focuses on the effects in the local authority area of Flintshire and the ward within which the Proposed Development is located (Connah's Quay Were). Where appropriate, benchmark data for Wales are also provided.
		2 km identified in Screening Opinion request in Solar proposal	residential receptors 175m from the site		
Scoped out	Not included	Most impacts insignificant to minor adverse. Direct construction and operation on assets moderate to major, but with mitigation reduced to minor to moderate.	Airborne noise and vibration Scoped out	Scoped out	Not included
As above	As above	As above	As above	As above	As above
	With mitigation to address potential ground contamination there would be no significant residual effects on the water environment, property or infrastructure.		HGV movements and other activity: noise will be small and operational mitigation is not required.	With mitigation there are expected to be no significant adverse impacts.	Socio-economic effects of proposed development is expected to be beneficial due to protection of existing jobs and additional employment numbers
Construction will give rise to a temporary, short-term increase in HGV traffic. Operation will give rise to a increase in vehicle movements for staff, visitors and deliveries.	The scoping report indicates that it is anticipated-pated that there will be no significant effects from ground contamination. If remedial works are required these would be have a beneficial effect.	Scoping identifies direct impacts on known and potential marine heritage as a result of construction work and changes to sediment in the estuary. Significant effects could include loss or damage to known and unknown buried assets.	Scoping indicates that during construction and operation vehicle movements would likely generate significant effects at noise sensitive receptors, particularly mentioned are residential receptors.	The scoping report indicates that mitigation will be required to ensure that residual effects are not significant. Also the report scopes out assessment of construction and operational traffic because the effect would be too small to have any significant effect on local air quality. Construction fugitive dust and particulates, emissions from the development are scoped in.	Scoping report indicates temporary direct and indirect employment creation, provision of training opportunities, adverse effects on traffic, businesses, community facilities and tourist attractions.

	Not included in scoping report	EIA Scoping: Potential significant adverse construction effect on below ground deposits from Roman period. Archaeological investigation proposed as mitigation. There ais potential for adverse marine heritage impacts. Overall, with mitigation there would be no significant adverse effects.	EIA Scoping: Construction of main site with mitigation expected to result in no residual significant noise effects. Operation, with mitigation is also expected to result in no residual effects.	EIA Scoping: dust and traffic emissions during construction could effect amenity, people and ecological receptors. no air quality effects predicted in operation	EIA Scoping: No significant adverse effects on tourism at any stage.
EIA Scoping: Significant effects on traffic and transport during construction include increased traffic flow and a higher proportion of HGVs. In operation there would be no significant effects.	EIA Scoping: The report identifies a potential significant adverse construction stage effect on agricultural land, contaminated land controlled waters and ground stability. The latter is also considered to be a potential operational effect.	EIA Scoping: Construction: potential significant impact on buried archaeological assets and paleoenvironmental deposits, Schedules Ancient Monuments and non-designated historic assets. Temporary adverse effects on historic landscape.	EIA Scoping: Mitigation measures will be applied. The construction tasks that will potentially cause temporary significant effects are trenchless crossings, earthworks and vegetation clearance, construction compound, movement of heavy vehicles. Noise and vibration effects during construction are not considered likely to be significant beyond a 100m limit from the works.	EIA Scoping: Construction stage: potential impacts from dust and particulates. Guidance used by authors of scoping report states that with mitigation, air quality effects will not be significant outside the 25m redline boundary and 50m from roads carrying traffic. Operational stage: maintenance works could release CO2 and small volumes of hydrogen sulphide. Otherwise, generally insignificant.	EIA Scoping:
With mitigation it is expected that construction will not increase traffic more than 30%, which is considered to be a significant effect but will not be long standing and would affect only the local road network. The assessment indicates that operational stage traffic would not give rise to any significant effect.	With mitigation the project would not result in significant effects on underlying geology. The potential for contamination to land and soils is assessed as not significant.	With mitigation the effects of the project footprint on below ground archaeological remains will not be significant. Above ground heritage assets include Padeswood Hall and Farm which would be demolished. The demolition would not be significant.	With mitigation construction will cause adverse effects, but these are not evaluated in the NTS. During operation further mitigation will be included but the effect is not reported in the NTS.	With mitigation construction dust will have a negligible effect on the surrounding area during construction. During operation the discharge of waste gases and pollutants would be negligible.	
Possible conflict with scheme if construction of the scheme coincides with this project. However, as the project is still at an early stage concurrent construction seems unlikely.	On 91 ha high grade agricultural land, possible Grade 1, which will be lost to agricultural use for the life of the development.				

Population and Human Health		Materials	Climate Change & Greenhouse Gas Emissions		Cumulative Effects and inter relationships	
Population and Human Health 2017	Infrastructure	Waste	Climate	Major accidents and emergencies (2017)	Cumulative	Transboundary effects
With mitigation the likely effects on human health from reduced greenhouse gases are considered to be moderate beneficial and significant for children.		Mitigation including reuse and recovery of materials during construction are proposed. There is potential moderate adverse significant effect in the use of concrete. A potentially large or very large adverse effect from hazardous materials arising during construction. This effect could be reduced with more detailed assessment. No significant adverse effects during operation.	Compared to the existing Connah's Quay power station the proposed scheme would have a significant beneficial effect by reducing greenhouse gases. With mitigation the risk of flood, and wildfire is reduced. An In combination Climate Change Impact Assessment concluded that there are no significant residual effects on the surrounding environment.	With mitigation there are no likely significant adverse or beneficial effects anticipated.	Not reported in the preliminary assessments completed to date.	
Confirms that this topic is inherent throughout the EIA and will not form a separate chapter.	Notes that the site has all necessary infrastructure in place.	Notes that the existing site represents an important strategic waste facility and any site waste during construction will be covered by a SWMP as part of the CEMP for the construction phase. Final EIA includes a Waste Chapter and the *study area focuses on the management of waste and materials within the Site itself, but also considers the impact of the proposed development on a wider study area extending to the whole of England and Wales, which represents the likely extent of feedstock sourcing and waste management activity for the*	The approach proposed for this project is that consideration of climate will be inherent within the assessment of effects associated with other disciplines including Air Quality and Hydrology and Flood Risk	PEDW requires this topic to be scoped in as 'it is not possible to scope out major risk at this stage due to the proximity of major pipeline. No specific study area identified.	PEDW Response notes: PEDW considers that: *known schemes at pre-application stage (such as subject to consultation, or EIA Scoping and Screening) or at application stage should also be considered. It is unclear why the cumulative assessment is limited to a 2.5km search area. Due to the extent of the future emissions and the height of the proposed stacks and buildings, the ES should robustly justify why the search area* *is limited. A wider search area may be appropriate. Additionally, the ES should explain the rationale behind the criteria presented at paragraph 4.5.4 of the SR used to select the projects to be considered as part of the cumulative assessme* nt. Makes reference to the PINS guidance. Effects deemed individually not significant from the assessment, could cumulatively be significant, so inclusion criteria based on the most likely significant effects from this type of development may prove helpful when identifying what other developments should be accounted for. The criteria may vary from topic to topic. All of the other developments considered should be documented and the reasons for inclusion or exclusion should be clearly stated. Professional judgement should be used to avoid excluding other development	PEDW highlights: Schedule 4 Part 5 of the EIA Regulations requires a description of the likely significant transboundary effects to be provided in an ES. The ES should address this matter as appropriate.

			Considered within a variety of chapters by the virtue of the forecasting methods used make allowances for climate change. E.g. Air Quality and Flood Risk and Drainage chapter. It should also be noted that the proposals, by their nature (i.e. recycling and recovery of waste) provide positive effects in relation to this topic.			
Not included	Not included	Not included	Not included	Not included	EIA identifies an insignificant to minor intra-project cumulative impact on water and sediment receptors, in particular changes in dissolved oxygen as a result of dredging and disposal. A minor adverse impact on coastal birds. Insignificant to minor on fisheries. Insignificant to Minor on people and assets. Inter-project effects (other projects): cumulative includes marine projects further west on Anglesey, from lifeboat stations around the coast and at Connah's Quay, ports, navigation and shipping and commercial and recreational fishing. Overall the assessment is that adverse effects would be insignificant to minor.	Not considered, but the cumulative effects include those from other counties of Wales.
As above	As above	As above	As above	As above	As above	As above
	Traffic and transport not assessed, but mitigation measures for traffic management proposed.	Paper recycling scheme is unlikely to result in significant adverse effects and has the potential to have significant beneficial effects.			Inter-project cumulative effects include visual effect of the development on Weighbridge Road. This would be irrelevant to the visual effects of Dee Bridge Scheme. The paper mill could have effects on the designated ecological sites as a result of air quality. Dee Bridge is designed to match existing bridge capacity with no increase in traffic intended.	
The main health benefits are from increased employment.		The scoping indicates that there would be negligible effects in relation to the size of the development. Effect o landfill capacity for inert and hazardous waste will be assessed.			Several developments including DNS development: solar farm, the Hynet pipeline, housing sites and a hazardous waste recovery plant are considered.	

EIA Scoping: No adverse effects on human health during construction with mitigation. Significant beneficial effect on children, as vulnerable receptors, as a result of reduced greenhouse gas emissions.	EIA Scoping: With mitigation using traffic management measures is expected to result in no significant effects during construction, operation and decommissioning.	EIA Scoping: Moderate adverse effect on materials and waste during construction. No significant effects in operation.	EIA Scoping: Operational stage is expected to result in significant beneficial effects in helping to meet Net Zero target.	EIA Scoping: No significant adverse effects anticipated.	EIA Scoping: No assessment of cumulative effects considered at scoping stage.
EIA Scoping: Construction stage significant effects expected on community and recreational facilities, private housing and property, agricultural holdings, users of PRoW, human health.		EIA Scoping: The scaler of development is not expected to impact on the availability of material resources. The effect on landfill capacity is also not considered likely to be significant.	EIA Scoping: Indicates some potential impacts but does not assess them in detail. The scoping identifies the main causes of impacts which include drought, extreme precipitation, storms, gales and extreme temperatures. Flooding is also mentioned. Greenhouse gases are considered only as to whether or north the y should be scoped into the full assessment.	EIA Scoping: Scopes in the low likelihood and high consequence events. Technological or manmade hazards are identified as a source of these events. Ground stability over min shafts, fires, pollution incidents, electrical power loss, utilities failure (gas and electricity), and malicious attacks are listed. No detailed assessment of these in considered in the scoping report.	
	In operation	Mitigation in the form of waste minimisation will reduce waste during construction and operation.	The project will not have a significant effect on the UK carbon budget during construction. During operation the carbon capture will reduce annual CO2 emissions from concrete production in the UK by 8%, which would be a significant beneficial effect.	An assessment identified that fire, loss of containment of Co2, structural failure or a major pollution incident were potential hazards. Additional measures have been proposed in the ES to address these.	Cumulative impact assessment completed with proposed developments in a 5km range. 11 projects were assessed. It was concluded that there would be no cumulative effects with other projects.
			The project seems likely to have a significant beneficial effect on the UK carbon budget during operation.		

MAXIMUM?	Additional details	Potentially in-combination effects	Proposed mitigation applicable	Potential Residual cumulative matters *(assuming that all effects greater than negligible are considered significant (NRW)).*
	Ongoing development site. FCC June 2022 LDP MAC details state: 'The mixed use site provides for 1,325 new homes and will include affordable housing. The site benefits from two out*line permissions and is a 'commitment' but the 1,325 dwellings will be included as a strategic allocation within the housing balance sheet, rather than as a commitment, in order to avoid double counting. In terms of employment land the site will deliver some 72.4ha of B2 and B8 employment land, which reflects the general nature of employment development in the locality and the fact that B1 high quality employment land is available elsewhere in the County. In order to support the employment and housing development the scheme will provide a commercial hub and district centre adjacent to the A550.* *Land will also be provided along with a financial contribution to enable the provision of an extension to the existing primary school. Infrastructure investment has taken place by strengthening and raising the River Dee flood defences and internal access roads are also being delivered by Welsh Government. A sustainable drainage and flood management scheme will also be secured as part of the detailed design of the scheme'.*	The site, and the larger overall original site, lies within the majority of the Scheme's ZOI's, and lies close to other CEA sites and Matrix 2 sites. Development of this site as well as site reference 2 will change the local views to/from the Scheme location. CEA potential impacts dependent on several factors: planning permission stages and expediency and LDP final outcome, for example. Several of the ES specialists have considered the implications for this site and the neighbouring CEA site reference number 2. Potential CEA effects considerations include from construction and operational stages, with the most likely potential to include the use of materials and waste generation, although this is not assessed as a moderate or greater impact.	The site represents one of the first and key development site near the Scheme. Ensure relevant considerations for all receptors embedded into the Scheme design and operational stages. Consider the timing of the Scheme construction and completion timetable in relation to the potential materials resourcing, and waste minimisation and generation as part of a CEMP.	Change in immediate locality with trip generation and activities. Other development and plans generation of waste.
	As above. In consultation with the FCC Planning Services, the total delivery time for the residential units to- 1186 total - be completed beyond the plan period.	The site, and the larger overall original site, lies within the majority of the Scheme's ZOI's, and lies close to other CEA sites and Matrix 2 sites. Development of this site as well as site reference 1 will change the local views to/from the Scheme location. CEA potential impacts dependent on several factors: planning permission stages and expediency and LDP final outcome, for example. Several od the ES specialists have considered the implications for this site and the neighbouring CEA site reference number 1. Potential CEA effects considerations include from construction and operational stages, with the most likely potential to include the use of materials and waste generation, although this is not assessed as a moderate or greater impact.	The site, and the larger overall original site, lies within the majority of the Scheme's ZOI's, and lies close to other CEA sites and Matrix 2 sites. CEA potential impacts dependent on several factors: planning permission stages and expediency and LDP final outcome, for example. Several of the ES specialists have considered the implications for this site and the neighbouring CEA site reference number 1. Potential CEA effects considerations include from construction and operational stages, with the most likely potential to include the use of materials and waste generation, although this is not assessed as a 'significant' impact.	Change in immediate locality with trip generation and activities. Other development and plans generation of waste.
		Likely in-combination (inter-protect effects) might occur during construction from sediment disturbance, although the additional effect of the Dee Bridge scheme would be minor compared to that scale of excavation and piling that is required at the Connah's Quay plant. Possible in combination effect on migrating fish and on waterbirds as a consequence of sediment disturbance and possible night time lighting of the water. The Dee Bridge scheme will have a much smaller footprint. In river works will be for a shorter duration. Operational effects would be no different from existing bridge. potential cumulative disturbance to features of interest of the protected sites including, habitats, otters and birds Possible visual impact on any viewpoints near Dee Bridge that can also view the Connah's Quay power station.	At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel. Programming of works at each location timed to avoid overlap of damaging construction activities.	Potential cumulative disturbance to features of interest of the protected sites including habitats, otters, birds.
	This depends on the development progressing further within the Scheme timescale.	Overall, site is relatively small and potential likelihood of effects focused on ecology and traffic generation, especially at construction stage. Temporary use of brownfield land and permanent pipe below ground. Scheme may have been implemented, as such no cumulative effects. In combination to be assessed.	No specific mitigation requirements. As with all of the short listed CEA sites identified, the Scheme HRA assessed implications with the River Dee designated features and other non- designated features are minimised.	Generation of construction waste.
	Planning application documents state the current employment numbers at the site as 190 and proposed total employees as approximately 853. Estimated sequential construction for the site estimated as three - four year period. Commencing September 2022. The LPA confirms that (as at 16/12/2022) that the energy infrastructure is necessary to power the redevelopment of the site and as such a DNS application is likely to come forward but no exact details available.	On going development with further potential if a DNS application pursued. A DNS application will need to complete full EIA and CEA assessment and this would need to cover this Scheme timetable. No significant CEA issues at this stage, although considerations for materials use and waste generation could potentially represent a significant part of a DNS CEA.	The Scheme HRA measures ensure any in- combination effects with the adjacent SAC designation is considered and minimised. Consideration to liaise with FCC Highways to ensure Scheme construction stage traffic managed and include as part of a CEMP.	Generation of construction waste.

		Several planning conditions approved. CEA dependent on commencement.	Overall site is small and implications or effects focusing on ecology and traffic especially at construction stage.	The Scheme HRA and related measures set out to safeguard River Dee designated features and other non-designated features. Consideration to liaise with FCC Highways to ensure Scheme construction stage traffic is managed, within the Scheme CEMP.	No significant in-combination cumulative effects envisaged
		The site development includes specific planning conditions details and lies near to the southern part of the Scheme and other CEA sites.	Overall site is relatively small and implications or effects focusing on ecology, hydrology and traffic/accessibility, especially at construction stage.	The Scheme HRA and related measures to ensure in combination effects with the site on the River Dee designated features and other non- designated features are minimised. Consideration to liaise with FCC Highways to ensure Scheme construction stage traffic is managed and include as part of a CEMP.	No significant in-combination cumulative effects envisaged
			Likely in-combination (inter-protect effects) might be on concentrations of sediment and siltation, waterborne oxygen, the Benthic habitats and species as well as waterbirds during construction. The potential for the Mostyn Dock extension to change siltation patterns upstream is not discussed in the EIA for that project but the assessment of Physical processes suggests that the localised effects on receptors would be insignificant to minor, while the effects on far-field would be insignificant.	The main effects of the Dee Bridge scheme would arise during construction. Mostyn Dock extension would give rise to construction and operation effects. At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel.	Construction stage effects on the body of water as a habitat and migration route, although the Dee Bridge effects will be short-lived. NRW concluded that the potential cumulative impacts and in-combination impacts due to this project have been adequately addressed in the ES and that no significant cumulative and in-combination assessment effects are predicted. The Dee Bridge Replacement Scheme was not included in their cumulative and in-combination assessment.
As above	As above	As above	Likely in-combination (inter-protect effects) might be on concentrations of sediment and siltation, waterborne oxygen, the Benthic habitats and species as well as waterbirds during construction. The potential for the Mostyn Dock extension to change siltation patterns upstream is not discussed in the EIA for that project but the assessment of Physical processes suggests that the localised effects on receptors would be insignificant to minor, while the effects on far-field would be insignificant. .	The main effects of the Dee Bridge scheme would arise during construction. Mostyn Dock extension would give rise to construction and operation effects. At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel.	Construction stage effects on the body of water as a habitat and migration route, although the Dee Bridge effects will be short-lived. Potential cumulative impacts and in-combination impacts due to this project have been adequately addressed in the ES and that no significant cumulative and in-combination assessment effects are predicted. The Dee Bridge Replacement Scheme was not included in their cumulative and in-combination assessment.
		Without any published details the following list of environmental effects is proposed as potential effects only. Sediment movements in the estuary would be changed. Flow in the estuary could be changed. Loss of habitat for Benthic species and waterbirds could be affected. Construction effects could be greater for all these than for operation. Beneficial effects from low-carbon power generation. Employment increased locally.	Likely in-combination (inter-protect effects) might be on concentrations of sediment and siltation, waterborne oxygen, the Benthic habitats and species as well as waterbirds during construction. The potential for the lagoon wall to change siltation patterns upstream is not discussed because the EIA has not been prepared and published for that project, but localised effects on receptors would be insignificant to minor, while the effects on far-field would be insignificant.	The main effects of the Dee Bridge scheme would arise during construction. The Dee Tidal Lagoon would give rise to construction and operation effects. At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel.	At this stage in the project development the actual effects cannot be determined.
			Likely in-combination (inter-protect effects) might occur during construction because construction periods could coincide or overlap. The main effect could be traffic congestion at the river crossing and adjacent junctions. These effects may not be significant.	At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel. Programming of works at each location timed to avoid overlap of damaging construction activities.	No significant in-combination cumulative effects envisaged
			Likely in-combination (inter-protect effects) might occur during construction from sediment disturbance, although the additional effect of the Dee Bridge scheme would be minor compared to that scale of excavation and piling that is required at the Hydrogen Plant. Possible in combination effect on migrating fish and on waterbirds as a consequence of sediment disturbance and possible night time lighting of the water. The Dee Bridge scheme will have a much smaller footprint. In river works will be for a shorter duration. Operational effects would be no different from existing bridge.	At Dee Bridge these effects would be comparatively minor or insignificant and might not coincide with construction at Mostyn Dock. Proposed mitigation at Dee Bridge takes the form of less damaging construction methods and minimising works in the water channel. Programming of works at each location timed to avoid overlap of damaging construction activities.	No significant in-combination cumulative effects envisaged

		Likely in-combination (inter-protect effects) during construction of Phase 1 of pipeline between 2026 and 2031. Construction effects might include visual impact on common receptors, traffic effects at the bridge and adjacent junctions, supply of materials. Also disturbance to features of interest of the protected sites including migratory fish, habitats, otters and birds.	Programming of works and traffic management to reduce or avoid traffic effects and visual impacts.	Construction visual impacts are possible, but with distance between schemes the effect would be small.
		Likely in-combination (inter-protect effects) during construction could include construction noise, traffic, where the pipeline crosses roads.	Programming of works and traffic management to reduce or avoid traffic effects and visual impacts.	No significant in-combination cumulative effects envisaged
		Likely in-combination (inter-protect effects) during construction could include traffic, disruption due to increases in HGV movements.	Programming of works and traffic management to reduce or avoid traffic effects and visual impacts.	No significant in-combination cumulative effects envisaged due to distance.
		Likely in combination (inter-project) effects during construction could include traffic disruption due to the increase in HGV movements and the effects on birds and views from nearby residential areas. Cumulative operational adverse effects are likely to include landscape and visual impact, impacts on breeding and overwintering birds.	Programming of works and traffic management to reduce or avoid traffic effects and visual impacts.	Without environmental and construction information for the proposed solar farm making any accurate predictions of significant inter-project cumulative effects, although landscape and visual impact is considered to be potentially significant.
	Recent WG announcements as part of the National Infrastructure Plan 2022 confirms the potential for this project. The project could include the need for planning permission or a development of national significance and compliance with EIA Regulations.	The range of potential in combination effects is likely to rely on the implications and actions identified for the project moving forward. This includes the significance of a proposed new North Wales Strategic Plan, with the related Joint Corporate Committee procedures. Experience suggests a '*lead up*' project time of approximately three years in the case of a defined highway infrastructure development to reach all key appraisal stages. As part of this approach, new highway Schemes are generally expected to be included as part of the adopted Local Planning Authority development plans, and would need to include potentially the new North Wales Strategic Development Plan. Several ES specialists note the potential for in- combination potential to arise with this route, but note the need for up to date baseline data and considerations in particular for materials and waste management.	This will depend on the current Scheme timeline and those related to the new highway route, and potentially as yet, unidentified CEA schemes - this includes the implications of the new FCC LDP. Experience suggests that a new road Scheme could potentially commence construction after the completion of this Scheme. Sone EIA specific topic matters e.g. Active travel, integrated travel; ecology, are capable of representing key topics for both Schemes and also, with other CEA developments in the locality. The potential 'mitigation' measures could include a collaborative approach towards integrating both Scheme at respective progress stages , from construction stage, post completion and operational stages. Consultation with the neighbouring authority Cheshire West would form part of this approach.	Changes brought about with other potential future new developments. Other development and plans generation of waste, including neighbouring authorities. The possible reintroduction of this project to the Welsh Government programme means that it is unlikely to occur concurrently with the Dee Bridge Scheme.

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 3: Technical Appendices

Appendix 18a: Outline Construction Environmental Management Plan

395318 | MMD-00-XX-RP-Z-0000

Report Issue | Revision | June 2025

Contents of Appendix 18A

1.1 Introduction and background

Responsibility for producing this EMP

1.1.1 This document is the Design Environmental Management Plan 'Design EMP' for the A494 River Dee Bridge Improvements 'the Scheme'. The Scheme Designer is responsible for producing the first iteration of this EMP.

Purpose of this document

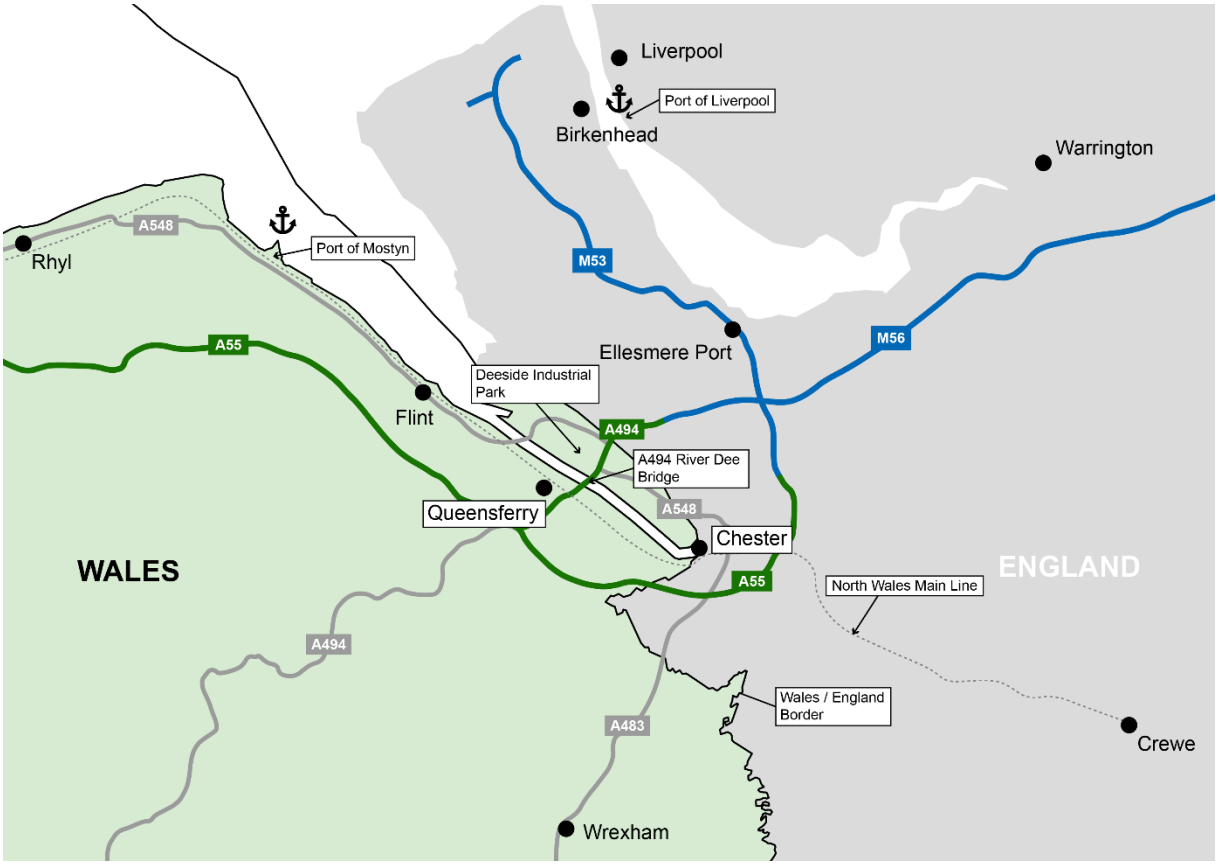
1.1.2 The Design EMP sets out control measures and the standards to be implemented throughout construction of the Scheme, which have been developed through the Environmental Impact Assessment (EIA), as reported in the Environmental Statement (ES).

1.1.3 The Scheme is within the administrative areas of Flintshire County Council. A description of the site, the Scheme and a high-level construction strategy is provided in Chapter 2 of the Environmental Statement. Chapter 18 of Environmental Statement also provides an overview of the Design- EMP and the Environmental Management requirements for construction. Each of the assessment chapters 6 to 16 set out the required mitigation and monitoring commitments. The EMP is intended to be a mechanism to carry these actions and commitments through design, construction and aftercare to ensure effective protection of the environment.

1.2 The Scheme

1.2.1 The Scheme is known as the River Dee Bridge Replacement and straddles the River Dee at Queensferry located in Flintshire, North Wales, approximately 10km west north west of the centre of the city of Chester, and 9.5km north east of Mold, the county town of Flintshire.

Figure 1-1 Scheme Location Plan



1.3 The programme

1.3.1 It is anticipated that the new bridge and connections could be open to all traffic by the end of 2029 subject to the consenting process, procurement of a contractor and construction programme. To achieve the opening date the following are the key anticipated dates:

Public Local Inquiry (if required):	Spring/Summer 2026
Ministers' decision to proceed:	Summer 2026
Site enabling works:	Autumn 2026 (earliest possible date)
Start of construction *(subject to utility diversion timescales*)	Winter/Spring 2027
Completion Construction Works:	Summer/Autumn 2029
Completion of 62 Month of contract Aftercare	Autumn 2034

The reason for the Scheme

1.3.2 There is evidence that the concrete deck of the A494 River Dee Bridge is deteriorating. This has continued despite routine maintenance and repairs by North and Mid Wales Trunk Road Agent (NMWTRA). There is a prohibition restricting the movement of abnormal loads over the structure. Closure of the bridge without a replacement would result in serious disruption including long distance diversions and disruption to the local road network and nearby communities over a lengthy period of time. Replacement of the bridge close to the south-eastern side of the existing bridge, to accommodate all traffic on two lanes in both directions, followed by demolition of the original bridge deck, forms the basis of the Scheme. The completed project would provide a single replacement bridge with two lanes of traffic and a total length of 1.25km improved carriageway either side of the bridge.

1.4 Project objectives

1.4.1 The following Transport Planning Objectives (TPOs) were aligned with Welsh Government and formalised as part of Stages 0/1 and 2 of the WelTAG process, to

provide clear aims for the project. Stakeholders participated in the setting of these TPOs which are set out in their final form as part of the WelTAG Stage 2 report.

Scheme Objectives

1.4.2 The Scheme's SMART objectives have been reviewed and updated to reflect the latest policy ambitions and priorities and are to:

1.4.3 Maintain connectivity of the A494 strategic corridor by addressing the life expired River Dee Bridge.

1.4.4 Maximise opportunities for modal shift through better provision for alternative modes.

1.4.5 Minimise Scheme whole-life carbon emissions through applying carbon reduction measures to design, construction, and operation.

1.4.6 Maintain and enhance the local environment by securing long term net benefit for biodiversity.

1.4.7 Improve resilience on the A494 corridor by minimising the impacts of incidents and accidents and enhancing safety for road users and maintenance personnel.

1.4.8 Maintain connectivity along the A494 strategic corridor during construction to minimise impacts on residents, businesses, strategic and local traffic.

Environmental Objectives

1.4.9 A set of draft Environmental Objectives (EO's) have been developed by the project team to align with Welsh Government planning and environmental policies and to improve and enhance the environmental performance of the best performing Scheme option (Option E). The nine EO's are set out below:

1.4.10 Protect and safeguard the designated site of the river Dee by avoiding or minimising adverse environmental impacts.

1.4.11 Enhance ecosystem resilience and secure long-term benefits for biodiversity.

1.4.12 Minimise environmental risks such as air and noise pollution and those posed by flood risk and coastal change.

1.4.13 Improve connectivity to adjacent ecosystems and deliver positive enhancement measures.

1.4.14 Protect and enhance the biodiversity and value of the soft estate and its resilience for future change.

1.4.15 Secure long-term mitigation and enhancement measures that are effective and resilient to climate change.

1.4.16 Deliver a network of green infrastructure and open green spaces and soft estate.

1.4.17 Minimise the use of carbon and reduce greenhouse gas emissions arising from construction and operational phases of the bridge replacement Scheme.

1.4.18 Ensure short-and long-term environmental mitigation and management measures are in place through the construction and operational stages of the Scheme.

2. Responsibilities

2.1.1 The key staff roles under the CEMP, are set out in Table 1.1. Additional roles and responsibilities will be developed as the detailed design progresses.

Table 2-1 Responsibilities

Name	Position/Responsibilities
Contractor's Environmental Manager	Responsible for running the Contractor's Environmental Management System, for managing the development of the River Dee Bridge Construction Environmental Management Plan and liaising with the Project Manager and Environmental Coordinator.
Designer's Environmental Coordinator	Working as part of the Contractor's design team Liaising with Statutory Environmental Bodies (SEBs), organising, chairing and reporting to the Environmental Liaison Group, working with the contractor's team to maintain and update the Register of Environmental Actions and Commitments (REAC) during detailed design, construction and aftercare. Agreeing environmental protection measures and controls in accordance with SEB requirements and to meet the requirements of the Ensuring measures and controls are implemented and communicated effectively. Liaising with the Project Manager and Environmental Clerk of Works to Investigating any incidents.
Construction Staff and workforce	Responding to and implementing the requirements for environmental actions or commitments, reporting environmental incidents in line with this plan and the procedure included within. Front line responsibility to enact requirements of the plan.
Contractor's Project Manager	Responsible for ensuring procedures are followed.
Employer's Environmental Co-ordinator	Monitoring the implementation of environmental mitigation during the Scheme and reporting to the Employer.

3. Content of the EMP and the REAC

3.1 Design iteration of the EMP

3.1.1 In advance of the procurement of a contractor for construction, the design team have prepared this draft Construction EMP containing several management plans which will inform the environmental management process.

3.1.2 The second iteration of the EMP, for construction will be prepared in accordance with the requirements of LA 120 Revision 1, referring to Appendix A Environmental Management Plan Structure, Table A.2.

3.2 Purpose of the Outline-CEMP

3.2.1 The Outline-CEMP would include updates from pre-construction surveys and any modifications because of commitments made at the Public Inquiry. The Outline-CEMP would then be made available for the key stakeholders to comment on and would be in place before construction on site commences. During construction the CEMP would be modified as necessary to take account of changes arising during construction works. These modifications could include changes to the design to reflect site conditions, but also because of:

a) new legislation or standards;

b) unforeseen site conditions, for example the discovery of ground contamination, a previously unknown protected species, or archaeological discoveries;

c) failings in the environmental performance of the Contractor that require improved procedures, or changes in the design.

3.2.2 The Outline-CEMP provides a consistent approach to the management of construction activities. The purpose of the Outline-CEMP is to:

a) record environmental risks and identify how they would be managed during the construction period;

b) provide a means of identifying environmental commitments, objectives and targets;

c) provide a means of monitoring and reporting performance against the objectives and targets;

d) provide a framework to ensure that all parties are aware of their responsibilities;

e) set out the personnel required to implement the CEMP and the responsibilities of each person;

f) establish a checklist of control procedures which must be integrated into the overall environmental management system.

g) describe how construction activities would be undertaken and managed in accordance with the obligations of environmental legislation and policy, and the requirements of environmental regulatory authorities and third parties;

h) provide detailed Environmental Management and Action Plans for reducing the potential for environmental impacts during construction;

i) define the activities that may require consents or licences;

j) act as a link and main document reference for environmental issues between the design and construction stage; and

k) ensure the requirements of the Environmental Statement (ES) and the Commitments Register are met.

3.3 Stages in development of the Design-EMP

3.3.1 The Outline-CEMP is a ‘live’ document subject to refinement, amendment and expansion as necessary, following engagement with stakeholders and local communities, and following any modifications made at the Public Local Inquiry. Further evolution occurs as the Scheme design, assessment and consenting processes proceed.

3.3.2 A summary of the stages of the development of the CEMP is presented below:

Stage	Description	Output
EIA	Assessment of the environment to identify sensitivity to development and likely requirements for avoidance, mitigation and monitoring	Environmental Statement Draft REAC Outline CEMP
Design EMP	Developed as the Scheme proceeds through the statutory processes towards construction, setting out a series of proposed measures and standards of work that will be applied during the contract, aftercare and operation of the Scheme.	CEMP Preconstruction REAC
Construction EMP	Adopted and implemented by the Contractor in accordance with the requirements of ISO 14001, the CEMP is reviewed and continuously updated through construction by the contractor's environmental manager. Performance would be reported to the Environmental Liaison Group. On completion of construction the CEMP, with the REAC at its core, will contain records and evidence of the completion of all stages of the Scheme to the required standard.	Final CEMP Completed REAC Evidence base of reports, photographs, as built drawings, minutes of meetings, records of incidents, audits and proposed changes to procedures. Records of innovation that might assist the maintaining body.
	Taken through aftercare with continuing development adding records of site activities and problems encountered as well as innovations applied to might assist the future maintenance body.	
Final CEMP	Handover Environmental Management Plans ("HEMP") - towards the end of the construction and aftercare period the final CEMP will form the HEMP which will contain all the evidence and history of completion and setting out the proposed strategy for the future maintenance and management of all environmental areas and mitigation	Package of information handed on to the Maintaining body.

4. Draft Register of Environmental Actions and Commitments

4.1.1 The Outline-CEMP contains a Register of Environmental Actions and Commitments (REAC) which is designed to record the mitigation and other commitments adopted by the project team. The draft REAC contains initial commitments and is intended for updating as a live document as the Scheme is developed through design and consultation.

4.1.2 Produced during the Design stage, the Outline REAC is available as an appendix in Volume 3 of the ES. It provides the following:

a) clear and specific description of the action/commitment, including the specific location;

b) the assumptions on which the action is based;

c) the objective of the action, including alignment with those set out in Section 1.3. Reference to relevant legislation requirements;

d) how the action is to be implemented/ achieved, including details of risk management;

e) the source of the action (e.g. EAR/ES, Habitat Regulations assessment, Equality Impact Assessment, Traffic Management Plan) including confirmation of commitments agreed with stakeholders;

f) name of the person responsible for the action;

g) achievement criteria;

h) the anticipated project stage, date of implementation or achievement; and 9) details of any monitoring required (including in relation to likely significant adverse effects). Note: Include reference to mitigation commitments relied on within the EIA screening (determination).

5. Environmental Asset data and drawings

5.1.1 An Environmental Masterplan is included as figures within Volume 2 of the ES.

5.1.2 Further drawings will be produced at Detailed Design and As-built drawings will be prepared following completion of construction.

5.1.3 Details of environmental surveys are provided in the ES Volumes 1 and Volume 3.

5.1.4 All drawings and survey data will be updated during the detailed design and construction. A register of those drawings and reports is to be maintained within the CEMP and the current revision will be available in a digital form for reference.

6. Details of maintenance and EMP monitoring activities

6.1.1 The requirements for maintenance and monitoring are set out in Appendix 18B.

7. Glossary

7.1.1 Several terms are used to describe the stages of implementing environmental mitigation. The Contractor's project manager would have overall responsibility for the construction of the new Scheme and appoint or nominate staff to manage the environmental aspects for the contractor before construction commenced. The specific tasks of the Employer's and Contractor's environmental staff will be set out in the CEMP.

7.1.2 The following terms are important:

Terms used	**Used to describe:**
'Design'	The period of route identification, preliminary design and consenting process. This is the first iteration of the EMP.
'*Construction*'	All site preparation, demolition, earthworks, waste removal and related engineering and construction activities required for the Scheme to be built. Second iteration of the EMP refined during the construction stage but in advance of construction activity.
'End of construction'	Completion of all construction activity. The third iteration of he EMP refined at the end of construction stage to support future management and operation.
'*Aftercare*'	the period after construction works are completed and the contractor is responsible for the management and maintenance of soils, existing vegetation, ecological measures, new grass, and newly planted trees and shrubs within the Scheme boundary. Aftercare is normally between 3 and 5 years in duration and often included monitoring of these performance of mitigation
'*Handover*'	is the period when responsibility for maintenance and management is transferred to Welsh Government's maintenance contractor. The REAC would be handed over to the body responsible for managing and monitoring the soft estate on behalf of Welsh Government.
'Soft estate'	the full extent of landscape, ecological and environmental mitigation and enhancement measures within the land controlled by Welsh Government for a given scheme.

'REAC'	Register of Environmental Actions and Commitments. A spreadsheet which is updated throughout the development and operation of the Scheme to maintain a record of all data relevant to the state of the soft estate and environmental commitments. It serves as proof of actions being completed and commitments fulfilled at the time and place required.

8. Annexes

Table 8-1 Annexes within the Outline-CEMP

	Annex title	Description
A	Regulatory Framework	A list of the legal statutory requirements for construction staff working on this Scheme.
B	Preliminary List of Permits and Consents	A list of the statutory consents and permits required before construction can proceed. Some items will be subject to seasonal requirements.
C	Invasive Non-Native Species (INNS) Management Plan	Identifies which invasive species have been identified on site and the procedure for construction works on how to deal with invasive species.
D	Soils Management Plan	To ensure that soils are stripped, stored to avoid compaction and deterioration, and reinstated in accordance with best practice and the DEFRA Code.
E	Outline Ground and Surface Water Management Plan	Developed in consultation with Natural Resources Wales (NRW). It describes the design of each element of the surface water management system required to manage surface water runoff during construction and potential risks to surface waters. It would include consideration of temporary storage and settlement requirements to manage waterborne sediment, water quality criteria to ensure that any discharge to receiving watercourses meets regulatory requirements.
F	Outline Pollution Control and Prevention Plan	Identifies the main risks of pollution during construction and the prevention measures which should be implemented to prevent or reduce the effects. Will include concrete batching and all other high pollution risk activities.
G	Outline Cultural Heritage Management Plan (CHMP)	Using the findings of the EIA, the CHMP should contain detailed method statements for the management of cultural heritage during construction (from survey, machine excavation, hand-excavation, environmental sampling etc. to office-based activities such as finds processing, database use, reporting etc.). The 'Written Scheme of Investigation' for archaeology would provide the core of the CHMP.
H	Outline Ecological Management Plan	This outline plan sets out the easures and procedures for reducing impacts on ecological receptors. It outlines the procedures for preconstruction surveys, vegetation clearance, draining of water features, translocating of hedges or trees, temporary or permanent measures for protected species.
I	Contaminated Materials Management Plan	Control of activities associated with contaminated materials and on-site treatment
J	Dust Control Plan	To set out the measures for management of dust generating materials and activities.

	Annex title	Description
K	Construction Noise Management Plan	To set out how the Best Practicable Means will be applied to limit construction noise.
L	Materials Management Pan	The MMP is used to plan and implement materials reuse on construction sites.
M	Outline Site Waste Management Plan (SWMP)	The Outline SWMP is used to plan, implement, monitor and review waste minimisation and management on construction sites. The plan can be based on the Waste and Resources Action Programme's ("WRAP") SWMP template. The plan should outline the procedures applicable to conducting a waste audit.
N	Hazardous Waste Plan	
O	Outline Materials Management Plan (MMP)	The Scheme's Outline MMP would detail how all construction phase materials (material resources and waste) would be managed, developed and implemented by the appointed Contractor and provides a framework which will be used as a basis from which to develop the Scheme's MMP.
P	Outline Cultural Heritage Management Plan (CHMP)	Informed by the outcome of the EIA the CHMP should contain detailed method statements for the Scheme construction (from survey, machine excavation, hand-excavation, environmental sampling etc. to office-based activities such as finds processing, database use, reporting etc.).
Q	Outline Ecological Management Plan	This outline plan sets out the measures and procedures for reducing impacts on ecological receptors. It outlines the procedures for preconstruction surveys, vegetation clearance, draining of ponds, translocating of hedges or trees, temporary or permanent measures for protected species.
R	Bio-security Risk Assessment	The contractor shall prepare a bio-security risk assessment to include the risks of introducing or spreading invasive species and the risk of introducing or spreading diseases which could affect both terrestrial and marine habitats and species.
S	Demolition Plan	Requires the Contractor to set out the method and sequence of construction and associated environmental protection, and to cross refer to other plans A to K, as necessary.
S	Construction Stage Traffic Management Plan	The contractor shall prepare a plan for traffic management to minimise effects on the environment and local residents / businesses. The plan shall cover footpath and cycleway closures, diversions and reopening.
T	Hazardous Weather and Flood Management Plans	To address climate change risks including storms, high temperatures, safe public access, heavy rainfall and flood risks

8.2 Annexe A: Regulatory Framework for construction phase

Introduction

8.2.1 This is a list of the main regulations and standards that apply to environmental protection during construction. There are other documents that apply, which are listed in the ES Chapter 5, and in the assessment Chapters 6 to 18. Generally, Welsh Government road schemes are developed under the Highways Act 1980.

Noise and Vibration

8.2.2 British Standards Institution (BSI) (2014). British Standard 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 1: Noise +Al: 2014.

8.2.3 British Standards Institution (BSI) (2014). British Standard 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 2: Vibration.

8.2.4 Part III of the Control of Pollution Act (1974).

Air Quality

8.2.5 Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2.

8.2.6 Environmental Protection Act 1990 and particularly Section 79(1)(d) relating to statutory nuisance.

8.2.7 Institute of Air Quality Management (IAQM) (2012). Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance.

8.2.8 Institute of Air Quality Management (IAQM) (2014) Guidance on the assessment of dust from demolition and construction.

Geology and Soils

8.2.9 Environmental Damage (Prevention and Remediation) Regulations 2009 Environment Act 1995

8.2.10 Environmental Protection Act 1990 and particularly Part IIA relating to contaminated land

Nature Conservation

8.2.11 The Conservation of Habitats and Species Regulations 2017;

8.2.12 Wildlife and Countryside Act 1981 (as amended);

8.2.13 The Environment (Wales) Act 2016;

8.2.14 Salmon and Freshwater Fisheries Act 1975;

8.2.15 The Protection of Badgers Act 1992;

Materials and Waste

8.2.16 The Waste (England and Wales) Regulations 2011 (as amended)

8.2.17 Hazardous Waste (England and Wales) Regulations 2005 (as amended)

8.2.18 Environmental Protection Act 1990

8.2.19 Environment (Wales) Act Part 1: "Sustainable management of natural resources" 2015

8.2.20 Environmental Permitting Regulations (England and Wales) 2010 (as amended)

8.2.21 Control of Pollution (Oil Storage) (Wales) Regulations 2016.

8.2.22 Protection of Surface and Groundwater Resources

8.2.23 Environmental Permitting (England and Wales) Regulations 2010 (as amended).

8.2.24 Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009

8.2.25 The Groundwater (England and Wales) Regulations 2009

8.2.26 Water Resources Act 1991

8.3 Annexe B: Preliminary list of permits/consents

Introduction

8.3.1 The permits and licences likely to be required for the Scheme are listed in 1.2. The likelihood of these being required is subject to the presence of species, the detailed design of the Scheme and the methods of Scheme construction. Consultation with the consenting authority will be undertaken in preparation for the submission of applications. Some licences can only be issued once the statutory process for the scheme has been completed, and in these cases the regulator will be asked to approve a 'ghost licence' indicating in advance their approval for the proposed activity.

Table 8-2 Summary of potential consents and licences

Consent/licence	Regulatory regime	Consenting authority	Status/comment (2025)
Derogation Licence for protected species	Conservation of Habitats and Species Regulations 2017	NRW	To be added
Marine Licence	Marine Licensing	NRW	To be added
Appropriate Assessment	Conservation of Habitats and Species Regulations 2017	NRW	To be added
PDO Assent	Wildlife and Countryside Act	NRW	To be added
Flood Risk Activity Permit	Flood Risk	NRW	To be added
Land Drainage Consent	Land Drainage Act 1991	FCC	To be added
Section 61 Consent for noise-generating activity	Control of Pollution Act 1974	FCC	To be added
Discharge Consent	Environmental Permitting	NRW	To be added
Abstraction Licence		NRW	To be added
Environmental permit (use of imported waste material)	Environmental Permitting	NRW	To be added

8.4 Inductions, training and briefing procedures for staff

Introduction

8.4.1 The site induction is a legal requirement for a health, safety and environmental briefing to be given to all personnel arriving at the site. This should occur from the start of a construction project through to completion with accurate and up to date records kept of all those who complete the induction. The briefing is intended to inform everybody on site about the site rules, hazards and procedures for day-to-day activity and for emergencies so ensure safe working and to protect the environment.

8.4.2 The Contractor will provide or instruct the Inductions, daily briefings and toolbox talks. Details will be set out in this section of the Contractor's Construction EMP.

Site Induction

8.4.3 The Induction should include:

a) Ensure that all personnel (main contractor, subcontractor, client staff and advisors) understand the layout of the site, the locations of entrances to the working area, welfare facilities, procedures for moving around the site;

b) Potential hazards, the risks associated and how to avoid harm and apply control and mitigation measures;

c) Emergency procedures, first aid arrangements, reporting of accidents and environmental damage;

d) Site rules and legal responsibilities;

e) The use of standard Personal Protection Equipment (PPE) and special requirements for additional measures.

f) Traffic management;

g) Policies regarding smoking, drinking and taking recreational drugs;

Daily briefing

8.4.4 Daily briefings are required for each construction team to bring personnel up to date with new site information, the day's tasks and any specific requirements for health, safety and environmental protection that apply during those tasks.

Toolbox talks

8.4.5 Will be provided by specialists in the contractor's teams to explain particular or unusual site requirements of personnel.

8.5 Annexe C: Outline invasive species management plan

Introduction

8.5.1 This is an Outline Invasive Species Management Plan which will be developed as the design of the Scheme progresses and in line with consultation and agreement with statutory bodies.

Invasive Species records at Key Stage 3.

8.5.2 The following invasive species have been recorded during pre-construction surveys or desk study:

a) Japanese knotweed (*Reynoutria japonica*);

b) Chinese Mitten Crab (*Eriocheir sinensis*) in the River Dee banks.

Locations of Invasive Species

8.5.3 Japanese knotweed was found on the southern and northern faces of the railway embankment at the rear of Dundas Street. Historically it was also present along the boundary between the Wastewater Treatment Works (WWTW) and the footpath leading north from Chemistry Lane.

Impact of Invasive Species

8.5.4 The release of material contaminated with invasive plant material or seeds could result in adverse effects on other habitats where material is deposited or stored. Effects of invasive species can include the displacement of native species and alteration of habitats, physical damage and obstruction, and economic damage or additional costs of routine maintenance.

Construction management and invasive species

8.5.5 The Invasive Species Management Plan will be implemented during construction to comply with legislation:

a) under the Wildlife and Countryside Act 1981 (as amended): it is an offence to allow listed species to spread into the wild; and

b) under the Environmental Protection Act 1990, Japanese Knotweed is classed as 'controlled waste' and as such must be disposed of safely at a licensed landfill site.

8.5.6 Before construction the detailed Invasive Species Management Plan will be developed and agreed with relevant statutory environmental bodies as part of the Construction Environmental Management Plan during the detailed design stage.

8.5.7 All site personnel should be made aware of the identification of the above species. Identification sheets for invasive species are available at: https://www.nonnativespecies.org/non-native-species/information-portal

8.5.8 The following UK Government site also provides useful background information on Invasive Species at

8.5.9 https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants

8.5.10 At construction stage, where invasive species are identified, a photographic record should be taken to confirm the species and details of the location (using a global position system (GPS) location reference). Findings should be reported to the ECoW as soon as practicable and always in advance of works which might cause their spread.

8.5.11 Methods of treating invasive species will be considered during detailed design when the quantities and exact location of invasive species which will need to be removed are identified. Where possible, material contaminated with invasive plant material (rhizomes, roots, stems corms or seeds) will either a) be isolated from disturbance and managed using appropriate herbicide or other means, or b) be disposed of within the construction site to reduce as far as possible the amount of material that might need to be disposed of at a suitably licensed landfill site.

8.5.12 Excavations close to areas of invasive species will be controlled to maintain appropriate stand-off distances and all excavation arisings will be inspected for the presence of invasive plant material in accordance with best practice and guidance.

8.6 Annexe D: Outline pollution control and prevention plan

Purpose of the plan

8.6.1 The purpose of this plan is to identify the main risks of pollution occurring on the site during construction and demolition activity, to identify and implement appropriate pollution prevention measures, and to reduce the effects of any pollution incidents that may occur. The plan should be read in conjunction with the Outline Ground and Surface Water Management Plan and CEMP.

8.6.2 The document comprises an Outline Pollution Control and Prevention Plan and is based on the information available at the outline design stage. As the detailed design progresses, the Plan would be reviewed and updated accordingly. The final Pollution Control and Prevention Plan would be agreed with Natural Resources Wales (NRW) before the start of construction.

Technical guidance

8.6.3 Best practice measures to prevent pollution will be implemented during the construction of the Scheme and the plan will take note of technical guidance, including:

a) Natural Resources Wales (NRW), PPG6 Construction and demolition sites: prevent pollution,

b) Northern Ireland Environment Agency (NIEA) and the Scottish Environmental Protection Agency (SEPA) the Guidance for Pollution Prevention (Works and maintenance in or near water :GPP 5 (February 2018)),

c) Construction industry guidance including CIRIA,

8.6.4 The plan would be implemented throughout the construction phase of the Scheme and all construction staff would be required to follow its provisions.

Responsibilities

8.6.5 The key staff roles under the Outline Pollution Control and Prevention Plan, are set out in Table 1.3. Additional roles and responsibilities will be developed as the detailed design progresses.

Table 8-3 Responsibilities

Name	Position/Responsibilities
Contractor's Environmental lead	Liaising with NRW to update the Plan during detailed design. Agreeing the pollution controls in accordance with NRW requirements. Ensuring pollution controls are implemented and communicated effectively. Investigating any incidents. Communicate learning from incidents. Liaise with regulatory bodies
Construction Staff and workforce	Responding to a pollution incident in line with this plan and the procedure included within. Front line responsibility to enact requirements of the plan.
Contractor's Project Manager	Responsible for ensuring procedures are followed.
Employer's Environmental Co-ordinator	Monitoring the implementation of environmental mitigation during the Scheme and reporting to the Employer

Pollution risk assessment

8.6.6 The risk assessment will consider:

a) Materials stored or transported and the condition of storage containers.

b) Hazardous substances known or possibly present in the structures to be demolished, e.g. lead in paint on existing A494 bridge, accumulations of tyre and brake dust.

c) Effects of accidents, flooding, vandalism and failure of containment.

d) Location on watercourses in proximity to the Scheme;

e) Sensitive groundwater location;

f) Designated and sensitive habitats.

g) Surface water drains that flow off the site.

h) Areas of unsurfaced ground.

i) Operations and layout of the construction site and contractor's compounds and lay down areas.

8.6.7 Table 1.4 sets out the materials that would be handled on site and activities that may be a hazard.

Table 8-4 Materials handled on site

Material	Hazards arising from activities
Fuels/chemicals/paints/coatings	Spillage during refilling (overfilling or poor handling) Damaged or leaking storage containers Equipment and containment failure
Sediment	Failure of pre-earthworks drainage Failure of lateral bunds Working too close to watercourse
Cementitious Dust	Inappropriate storage containers
Concrete and mortar	Spillage during handling Contact with watercourses (inappropriate placement, incorrect wash-out procedures)
Fill and aggregates	Silt run-off / dust blow to sensitive locations Drainage of acidic / alkaline water to sensitive locations

Site Design: Location and layout of construction compounds

8.6.8 Site compounds and carparks will be located away from all surface water features and watercourses and outside the floodplain (unless in areas protected by existing defences).

8.6.9 Risks arising from water pollution, storage of fuels, oils, wheel wash facilities, drainage and surface water run-off are detailed in the Outline Ground and Water Management Plan. Mitigations measures are described and will be developed and agreed before start of construction.

8.6.10 Wheel and heckle washing facilities will be established at designated site locations, away from watercourses and drains. Cleaning will be carried out in a bunded area and waste water will be either recycled or discharged to foul sewer (with consent from the sewerage undertaker). Contaminated waste will be removed from site by a licensed waste carrier for disposal to an appropriately licensed facility.

Pollution incident response plan

8.6.11 A pollution incident response plan will be designed for every construction compound, haul road and laydown area. The plan will set out the actions to be taken in the event of a pollution incident and identify the pollution control equipment and the control devices and where they should be located.

8.6.12 The Response Plan would contain the following key information:

a) External and internal list containing 24 hour contact details for organisations that may need to be involved during or after an incident, for example, the emergency services, NRW, or Flintshire County Council;

b) Chemical and waste inventory: an up-to-date record of all substances stored on site would be maintained together with an estimate of the likely quantities stored and product data sheets. The location of drums, containers or bulk storage vessels used for storing potentially polluting chemicals would be identified on the site plan. The inventory would be made accessible to emergency responders;

c) Pollution prevention equipment inventory. This would include equipment and materials on site to deal with pollution incidents (for example spill kits, drain mats/covers, pipe blockers, absorbents) and contact details of staff trained in the use of specialist equipment (where relevant);

d) Site plan showing access routes and meeting points for emergency services; areas or facilities used to store raw materials, products and wastes; watercourses located within or near the site; and site drainage.

8.6.13 Key actions for the response plan would include:

a) Immediate cessation of the affected works;

b) Containing the spillage to avoid escalation of the problem (refer to Pollution Control Hierarch);

c) Immediate notification of the Environmental Coordinator and any other key staff;

d) Evacuation of staff if necessary;

e) Call to emergency services, if required;

f) Deployment and application of pollution control equipment;

g) A written record of the event should be made covering the cause of the incident and the action taken. This should be supported by a photographic record where feasible;

h) Replace pollution control equipment where required to ensure readiness for further events;

i) Identification of improvements to procedures to support any response to future events.

Practice

8.6.14 Staff will be trained in the procedures to follow if there is a pollution incident, in particular:

a) where the personnel protective equipment and pollution control equipment is stored;

b) how to use the equipment; and

c) the location of pollution incident response plan.

8.6.15 In the development of the pollution incident response plan, drafts will be sent to NRW, and/or Flintshire County Council, as relevant, for comment including advice on when to notify the regulators about a spill.

Fire plan

8.6.16 The contractor will develop a fire plan following guidance set out in PPG18 Pollution prevention guidelines - managing fire water and major spillages. Plan to set out action to be taken in the event of fire including:

a) Raising the alarm

b) Calling the Fire Brigade

c) On hearing the alarm, the area must be evacuated immediately and staff to assemble at the Muster point.

d) Escorting visitors, clients and external contractors to the assembly point.

e) Turning off generators, compressors and other powered equipment.

f) Turning off heat-producing equipment and shut cylinder valve.

g) Attacking the fire with the fire-fighting equipment if it is safe to do so.

h) Obeying instructions from the Office Fire Marshall or supervisory staff.

i) Ensuring that nobody re-enters the working area until told it is safe to do so. If necessary, inform others who may be affected by the fire (smoke near hospitals, schools and other sensitive locations.

8.6.17 The capacity of the construction surface water management system should be sufficient to contain the water applied by a fire engine within the site's boundaries, avoiding direct spillage of potentially contaminated material into the natural watercourses.

Pollution hierarchy

8.6.18 Response plans for pollution incidents consisting of spillage of liquids, or contamination of water, should be based on following hierarchy:

a) Contain at source

b) Contain close to the source

c) Contain on the surface

d) Contain in the drainage system

e) Contain on or in the watercourse

8.6.19 The preliminary pollution risk assessment has identified that the most likely causes of a pollution incident would involve:

a) spillage of oils or chemicals;

b) discharge of sediment-laden water or other pollutant into a watercourse; or

c) fire-fighting water runoff.

8.6.20 Pollution control equipment would be appropriate for the chemicals/substances being used, and the location of the site (particularly works within the River Dee). For example, absorbent materials such as sand, spill granules, absorbent pads and booms will be kept at each site compound, on plant working near watercourses and particularly at refuelling areas and where fuel or oil is stored.

8.6.21 Following a pollution incident, used pollution control equipment (for example, spill kits) would be disposed of appropriately and new /replacement equipment would be provided.

8.6.22 Response plans should consider:

a) PRIORITY: stop spillage or leak and contain at source when possible;
b) contain spillage or leak as close to source as possible;
c) stop pollutant spreading by using oil booms, terram-wrapped barriers, sand bags, earth dams, hay bales as applicable;
d) trace impacts further downstream to establish extent of pollution;
e) review the activity that caused the pollution before restarting work;
f) RESERVE: when it is impossible to prevent the spill at source reaching a watercourse;
g) stop the pollutant flow at point of discharge;
h) stop the flow spreading;
i) dam the flow with earth/sand/polythene/absorbent material;
j) divert the flow from drains/watercourses where possible;
k) blank off drains with drain covers or sandbags;
l) check the site drainage plan- where will spill end up?

Discovery of contaminated land

8.6.23 The Pollution Control and Prevention Plan should anticipate encountering previously unidentified chemical contamination and asbestos during construction works by ensuring that personnel involved in the earthworks are briefed on the

likely nature and type of soils that could indicate the presence of contamination (e.g. asbestos, discolouration, oils, odours, ash and clinker materials).

8.6.24 If contaminated material is encountered:

a) The environmental lead should be contacted immediately to inspect the material and instruct its isolation if necessary.

b) Suspected contaminated material will be tested and the material will not be reused or removed until the results of the tests have been reviewed.

c) Contaminated materials will be handled and managed in line with Annexe G.

Training

8.6.25 This procedure will be discussed in the Site induction. It will be displayed on noticeboards along with contact details of relevant individuals.

8.6.26 All personnel must attend a site induction before commencing work on the site. A separate site indication should be developed for all site visitors.

8.6.27 The induction will discuss the Pollution Control and Prevention Plan and include key environmental issues on the project including the sensitivity of the watercourses, contamination, and air quality management. The briefing will emphasise the methods and working practices employed for protection, including emergency procedures for reporting and dealing with environmental incidents.

8.6.28 Toolbox talks and method statement briefings should be given to the construction (and demolition) teams as work proceeds and would cover the types of wastes produced at each key build stage, and the site waste management plan controls related to specific activities undertaken during the works. A full register of toolbox talks and method statement briefing attendance would be maintained on site.

8.6.29 All staff will receive relevant training on environmental issues throughout the construction of the project.

8.6.30 All training records ware to be maintained and filed on site. The records would include the content of the training courses (induction and toolbox training), record of attendance and schedule of review.

8.6.31 All method statements will include an environmental section and any specific pollution control and prevention information.

8.6.32 Drills of the emergency response plans will be carried out regularly to ensure understanding.

Monitoring, review and reporting

8.6.33 Should a situation arise where the proposed mitigation is not adequate, this plan will be reviewed. It will also be reviewed quarterly by the contractor's Environmental lead to ensure it is up to date and accurate.

8.6.34 Specific monitoring requirements will be detailed. Nominated staff will carry out regular site inspections to control measures are in place and adhered to during the works.

8.6.35 Any instances of pollution or spill will be reported immediately to the Environmental lead who will investigate and communicate the investigation's conclusions to the project team to aid continuous improvement and to prevent reoccurrence of the event.

8.6.36 Records including inspection records, site plans and progress reports will be maintained to show compliance with the Pollution Control and Prevention Plan.

8.6.37 Surface water monitoring will be undertaken to demonstrate no adverse effects on water quality during construction works. An appropriate monitoring schedule and programme will be agreed with NRW.

8.7 Annexe E: Outline site waste management plan

Purpose of the plan

8.7.1 The purpose of the Site Waste Management Plan (SWMP) is to set out proposals for the identification, segregation, handling and storage of different types of wastes identified as arising from the works. These wastes (by quantity/type/chemical composition/EWC code, etc.) will be recorded and their disposal route, including the place of their final disposal, shall be reported in the Construction Environmental Management Plan and the REAC where specific actions and commitments require.

8.7.2 The aim of using a SWMP is to minimise the amount of waste produced by activities within the project, minimising environmental impacts and maximising cost savings. The Employer and Principal Contractor (to be appointed) shall take all reasonable steps to ensure all waste from this site shall be dealt with in accordance with the waste duty of care in section 34 of the Environmental Protection Act 1990 (Duty of Care Regulations 1991 (b)) and materials will be handled efficiently and waste managed appropriately.

8.7.3 The existing bridge over the River Dee is to be demolished once the new bridge is completed. The substantial volumes and weight of waste generated by the demolition must not be allowed to enter the river which is protected by several statutory designations.

Estimated Waste Arisings

8.7.4 The classification of substances as waste is the basis for the formulation of waste management and the application of controls to protect the environment and human health.

8.7.5 The EU Waste Framework Directive (Directive 2008/98/EC) includes a common definition of 'waste', which is *'any substance or object which the holder discards or intends to discard'*. The term 'discard' includes the disposal, recovery or recycling of a substance. Re-using suitable materials on site in accordance with a Materials Management Plan can avoid material becoming waste – see Annexe G.

8.7.6 Some types of waste are harmful to human health, or to the environment, either immediately or over an extended period. These are called hazardous wastes in England and Wales.

8.7.7 Once a material has become waste, it remains waste until it has been fully recovered in accordance with an Environmental Permit ('End of Waste' status) and no longer poses a potential threat to the environment or to human health, at which point it is no longer subject to the controls and other measures required by the Directive. Certain waste activities can be carried out by registering an Exemption from the need for an Environmental Permit.

8.7.8 The type and quantities of waste likely to arise because of each stage of the project are listed in Table 1.5. The intended use of each waste arising has been identified, based on the current available information. The table is not an exhaustive list of waste types and will require extension as the detailed design develops.

Waste management hierarchy

8.7.9 Construction waste generated from the Scheme will be managed according to the principles of the waste hierarchy which ranks waste management options according to environmental impact. The waste hierarchy indicates "waste prevention" as the best outcome for the environment and "disposal" as the least favoured.

8.7.10 The SWMP will set out how waste will be managed throughout each stage of the project. Before construction starts, the Principal Contractor will identify suitable waste management contractors and investigate opportunities to recycle other materials. The SWMP will record measures to be implemented to prevent and minimise the quantity of waste produced during the project. The following measures have been identified at this stage:

a) all waste arisings to be segregated on site;

b) re-usable materials to be identified on site and removed for storage and re-sale;

c) recyclable materials to be removed from site for processing in licenced facilities; and

d) recoverable materials will be removed from site for processing in licenced facilities.

Waste Prevention

8.7.11 The Contractor will ensure that waste is prevented where possible, by using less material in design and manufacture, and only ordering the quantities of material required.

8.7.12 The Outline Materials Management Plan (Annexe G) sets out the procedure for managing the materials to minimise the amount of waste generated.

Waste Re-use

8.7.13 The Contractor will ensure that any waste generated on site will be re-used where possible. The materials that have the potential to be re-used on site have been identified in Table 1.5. This will be confirmed during detailed design.

Waste Recycling

8.7.14 As a requirement of this SWMP only appropriately qualified and licensed waste management facilities would be used. Recycling facilities in the vicinity of the proposed Scheme location will be identified by the Principal Contractor, evaluating the waste management market and identifying suitable options.

Table 8-5 Estimated waste arisings from each stage

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
Site clearance	Inert concrete	Quantities not available at this stage.	Segregated and disposed of off-site, or crushed for re-use
	Packaging (general waste from compound area and welfare set-up)	Quantities not known at this stage	Total over construction period
	Inert materials	Quantities not known at this stage	Unsuitable for re-use; disposed of off-site
	Existing surfacing materials bituminous	Quantities not known at this stage	Recycled for re-use on site

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
	Invasive non-native species (INNS) including Japanese Knotweed (plants and infested soils)	Quantities not known at this stage	See Annexe C Outline Invasive Species Management Plan
	Vegetation (branches, stumps etc)	Quantities not known at this stage	Typically shredded for re-use
Demolition and construction	Surplus and unsuitable soils	Quantities not known at this stage	Removed for off-site use or recycling
	Mixed construction and demolition wastes	Quantities not known at this stage	Removed for off-site recycling
	Surplus concrete	Quantities not known at this stage	Return to batching plant for recycling
	Packaging and domestic waste from site compound	Quantities not known at this stage	Segregated and disposed of off-site, recycled where possible
	Liquid waste from site compound septic tank	Quantities not known at this stage	Transported to off-site treatment works
	Crushed stone (material imported for temporary bridge launch platform)	Quantities not known at this stage	Recycled for re-use on site. Dependent on scale an exemption or environmental permit may be required.
Operation and maintenance of asset	Replacement of bearings	Quantities not known at this stage	Removed for off-site recycling
	Replaced expansion joints	Quantities not known at this stage	Removed for off-site recycling
	Replaced parapets	Quantities not known at this stage	Removed for off-site recycling
	Resurfacing material	Quantities not known at this stage	Removed for off-site recycling
	Vegetation (branches, tree thinning)	Quantities not known at this stage	Shredded or habitat piles on site
More?	Details	Details	Details

Waste Recovery

8.7.15 Several sites in Flintshire and neighbouring counties accept inert wastes (mainly soils) for 'Recovery by Deposit' uses, such as restoring former quarries.

Waste Disposal

8.7.16 Any waste that cannot be prevented, re-used, recycled or recovered, will be disposed of in a responsible manner.

8.7.17 Local waste management facilities will be identified and assessed to ensure adequate capacity for the waste generated by the proposed Scheme. It is not anticipated that there will be a large amount of waste associated with the proposed Scheme.

Waste Storage

8.7.18 To be confirmed at detailed design stage

Waste management facilities (on-site)

8.7.19 To be confirmed at detailed design stage

Implementing the Site Waste Management Plan

Roles and Responsibilities

8.7.20 The key roles and associated responsibilities regarding this plan are outlined below. The Construction (Design and Management) Regulations 2015 also identify the legal duties, responsibilities and obligations of all the major roles within the construction team.

8.7.21 The Employer will be responsible for the following:

a) appointing the Principal Contractor for the purpose of the SWMP;

b) ensuring that the SWMP is implemented effectively; and

c) reviewing, revising and refining the SWMP (where necessary) in conjunction with the Principal Contractor.

d) The Principal Contractor has the overall responsibility for:

e) updating and delivering this SWMP on behalf of the client;

f) ensuring all procedures in this SWMP and followed;

g) ensuring all contractors are suitably qualified and experienced in implementing the measures within this SWMP. These measures would be contained within the terms of contracts to ensure understanding and accountability;

h) making and maintaining arrangements that enable those engaged in construction and demolition to co-operate effectively in promoting measures to manage waste in accordance with the terms of the SWMP;

i) ensuring, so far as is reasonably practicable, that waste produced during construction is re-used, recycled or recovered;

j) regularly reviewing (every three months as a minimum) the SWMP and update where necessary;

k) reporting on the performance of the SWMP within three months of the work being completed;

l) establishing procedures for the regular review and recording of the quality of the works as part of the Quality Management System; and

m) maintaining records relevant to this SWMP.

Training

8.7.22 A training programme focused on the provisions of the SWMP would be provided for all relevant members of the construction team, including those carrying out demolition works, to ensure their competence in carrying out their duties on the Scheme.

8.7.23 A general site induction would be developed to introduce all site personnel to the main provisions of the SWMP, important environmental controls associated with the construction of the Scheme and effective delivery of the SWMP (for example, waste

storage arrangements, waste segregation at source). A full register of induction attendance would be maintained on site.

8.7.24 Toolbox talks and method statement briefings would be given to the construction (and demolition) teams as work proceeds and would cover the types of wastes produced at each key construction stage, and the SWMP controls related to specific activities undertaken during the works. A full register of toolbox talks and method statement briefing attendance would be maintained on site.

Monitoring, Review and Reporting

Monitoring of the SWMP

8.7.25 Monitoring of the SWMP would principally be achieved through the completion of the Waste Management Data sheets and regular inspections of the works areas by the Principal Contractor to ensure that the provisions of this SWMP and control measures outlined in relevant method statements are being implemented.

8.7.26 Duty of Care paperwork documenting the movements of waste from the site (i.e. Waste Transfer Notes) and the registered carriers' details would be retained.

Review of the SWMP

8.7.27 During the construction process, the SWMP would be reviewed as often as necessary or at least once every three months to ensure that the plan accurately reflects the progress of the Scheme, its waste estimates and targets. As part of the review, the Principal Contractor must record the following:

a) the types and volumes of waste produced;

b) identify on the plan the work area where the waste was removed from;

c) the types and volumes of waste that have been:

d) re-used (and whether this was on or off site);

e) recycled (and whether this was on or off site);

f) sent for another form of recovery (and whether this was on or off site);

g) sent to landfill; or

h) otherwise disposed of.

Reporting the SWMP

8.7.28 Within three months of the end of construction, the Principal Contractor will report on the performance of the SWMP. This would include confirmation that the plan has been monitored on a regular basis to ensure compliance with the provisions of the SWMP, that the plan was updated accordingly and that any deviations from the plan would be explained.

8.7.29 In addition to the above, the report would include a comparison of the estimated quantities of each waste type against the actual quantities of each waste type, performance against the Scheme standards and an estimate of the cost savings achieved by and costs incurred in completing and implementing the plan.

8.8 Annexe F: Outline ground and surface water management plan

Introduction

8.8.1 This outline Ground and Surface Water Management Plan is based on the information available at the preliminary design stage. As the detailed design progresses, the plan would be reviewed and updated accordingly. The outline Ground and Surface Water Management Plan would be developed in consultation with Natural Resources Wales (NRW) and would be agreed before the start of construction.

8.8.2 The final Ground and Surface Water Management Plan (GSWMP) would consider all drainage required during the construction phase and refer to appropriate industry and regulatory pollution prevention guidelines. It shall describe the design of each element of surface water management system required to manage surface water runoff during construction and manage risks to surface waters. This shall include consideration of temporary storage and settlement capacity to manage the sediment load of waters. The GSWMP shall define the water quality criteria to ensure any discharge to receiving watercourses meets regulatory requirements.

8.8.3 The GSWMP shall consider all activities to be undertaken during the construction phase that may require groundwater control through pumping. The GSWMP shall consider structures required for managing groundwater in areas of cut, the excavations required for bridge pier foundations (particularly any requiring cofferdam construction) and excavations required for subsurface structures/utilities that may encounter shallow groundwater. The GSWMP shall define the nature and approach for groundwater management following its abstraction, including monitoring to determine the acceptability of chemical and physical quality for discharge to the surface water system.

Table 8-6 Responsibilities

Name	Position/Responsibilities
Environmental lead	Ensuring adequate planning is undertaken to protect surface and groundwater from pollution, and for monitoring the effectiveness of these plans.
Construction Staff and workforce	For the day-to-day implementation of the mitigation measures required minimising the impact arising from the works and for ensuring appropriate consents are in place and adhered to.
Project Manager	Responsible for ensuring procedures are followed.

Consents

8.8.4 The treatment of waters arising from construction activities, including any point source discharges resulting from the treatment of materials regulated by mobile plant licence, would require regulation by NRW. An application for an environmental permit (Discharge Consent) will be submitted before works commence. The permit will regulate the discharge of treated contaminated waters to ground, via re- injection (or possibly soakaway). A separate environmental permit will be required for each location.

8.8.5 An abstraction licence would be required for de-watering operations, and to provide water for dust suppression or pressure testing on site. A separate licence would be required for each location. An impoundment of water in any watercourse, or abstraction exceeding 20 cubic metres per day, would be controlled by means of NRW consent (Abstraction Licence).

8.8.6 Construction works carried out over, under or near a main river, or in a flood plain or flood defence (including a sea defence) will require a Flood Risk Activity Permit. A permit will be required for each location.

8.8.7 A Land Drainage Consent, issued by Flintshire County Council, is required for all works carried out over, under or near an ordinary watercourse. Ordinary watercourses include non-main rivers and all ditches, drains, cuts, culverts, dikes, sewers (other than public sewers) and passages through which water flows.

Mitigation Measures

Induction of site personnel

8.8.8 All personnel are to attend a site induction before commencing work on site. The briefing is to emphasise the sensitivity of the watercourses, surrounding habitat, and methods and working practices employed to protect the water environment.

Emergency Response Planning

8.8.9 An emergency response plan is to be developed in accordance with EA Guidance PPG21- Pollution Incidence Response Planning and Annexe D of this Outline-CEMP.

General Measures

8.8.10 Temporary drainage systems are to be installed and carefully managed to prevent localised flooding or pollution of surface and groundwater from silt and other contaminants.

8.8.11 In areas where potentially contaminated land has been identified, specific mitigation measures will be designed to manage and contain potential contamination in line with the Remediation Strategy Report. Detailed method statements will be prepared for works in these areas.

8.8.12 Risks arising from the main work activities to be carried out throughout the Scheme, and water management proposals currently being considered in mitigation, are listed in Table 8-7. This table is to be developed by the contractor when appointed.

Table 8-7 Outline mitigation measures

Risk or construction activities	Mitigation
Concrete wash water reaching groundwater	Details here
Excavation activities	Details here
Extensive filling operation	Details here
Site Compound Facilities (including Car Parks)	Details here
Vehicle/Plant Movements	Details here
Wheel wash facilities	Details here
Aquatic Protection	Details here
Storage of fuels, oils and other chemicals	Details here
Drainage and flood risk	Details here
Surface water run-off/Silt from earthworks and bridge abutment works.	Details here

Special measures

8.8.13 This section is to be completed at detailed design stage by the Contractor.

Fuel Storage and Refuelling

8.8.14 All fuel storage would be in bunded, locked tanks, located in secure areas at the compounds, outside the floodplain. A controlled procedure for refuelling of plant is to be adopted across the works. All practicable means of securing fuel on mobile plant are to be utilised. Refuelling will be carried out by appointed competent persons only. Measures to prevent pollution would be developed in alignment with PPGs and would include:

a) drip trays to be utilised underneath static plant; including generators;

b) spill kits to be available within each item of mechanical plant. Trained persons would be present on site to deal with fuel spillage;

c) no plant to be positioned within a watercourse (including all existing dry ditches and field drains) without full consideration of all available alternatives.

Topsoil Stripping and Storage

8.8.15 Wherever possible, vegetated topsoil will be left in place to minimise the amount of unprotected ground exposed to runoff. Essential topsoil stripping will be programmed to minimise the duration of exposed ground. Topsoil will be stored in designated locations outside the floodplain.

8.8.16 Before vegetation clearance and soil stripping operations within 10m of a watercourse commence, silt and runoff control measures would be implemented to prevent contamination.

8.8.17 Topsoil stockpiles would be created and managed in accordance with best practice guidance. The stockpiles would be graded and 'sealed' by surface compaction to minimise water ingress, prevent ponding, and to help shed rainwater. Exposed stockpiles that are to remain for long periods would be seeded with a simple grass seed mix immediately upon completion and in suitable weather conditions. This would minimise soil erosion during the soil storage period and to help reduce colonisation of nuisance weeds.

8.8.18 Where necessary, silt fencing would be installed around the margins of topsoil mounds to minimise the risk of sediment-laden runoff reaching watercourses.

Cut off ditches

8.8.19 Cut-off ditches would be constructed where site planning shows them to be required to intercept overland flow from adjacent land areas, protecting the site.

8.8.20 Within the cut-off ditches, temporary baffles will be formed to break up the flow distances and promote the settlement of fines. These baffles would be constructed from clean stone within geotextile bags and would be placed where there is a significant gradient in the ditch and/or long ditch sections leading to a single outfall.

8.8.21 Run off from earthworks areas will be intercepted before entering watercourses, or filtered by silt fencing, to prevent pollution. Similarly baffles and other methods (e.g. straw bales) would be employed to prevent dirty water reaching local watercourses.

Settlement Pond Maintenance

8.8.22 Pond and/or ditch maintenance during the construction phase would be carried out during periods of dry weather. The ponds would be drained, and sediment will be removed utilising a small excavator. The operator would be careful not to disturb the ponds' formation whilst removing silt. This operation would not be carried out whilst water is flowing or prior to a forecasted rainfall event due to the potential remobilisation of silt. Ponds would be regularly inspected for integrity and any defects remedied immediately.

Management of Dust

8.8.23 Dust mobilisation from haul routes would be minimised by controlling vehicle speeds and damping down when required. This would minimise dust pollution causing nuisance to neighbouring properties and businesses along the route.

Controlling Mud on local roads

8.8.24 Wheel washing and other road / vehicle cleaning facilities would be provided as suited to each location where vehicles need to move onto the public highway.

Monitoring, Review and Reporting

8.8.25 In accordance with Pollution Prevention Guidelines (PPGs) and relevant construction industry guidance, best practice measures to protect the water environment will be implemented during the construction of the Scheme.

8.8.26 Should a situation arise where the proposed mitigation is not adequate, this plan will be reviewed. It will also be reviewed quarterly by the Environmental lead to ensure it is up to date and accurate.

8.8.27 Specific monitoring requirements will be detailed. Nominated staff will carry out regular site inspections to control measures are in place and adhered to during the works.

8.8.28 Any instances of surface or groundwater pollution will be reported immediately to the Environmental lead who will investigate and communicate the investigation's

conclusions to the project team to aid continuous improvement and to prevent reoccurrence of the event.

8.8.29 Records including inspection records, site plans and progress reports will be maintained to show compliance with the GSWMP.

8.8.30 Surface water monitoring will be undertaken to demonstrate no adverse effects on water quality during construction works. An appropriate monitoring schedule and programme will be agreed with NRW.

8.9 Annexe G: Outline materials management plan

Introduction

8.9.1 The Contractor shall include within the Construction Environmental Management Plan (CEMP) a Materials Management Plan (MMP) if required. This shall be based on an appropriate risk assessment.

8.9.2 This report presents the approach for managing the reuse of site-won soils and provides an outline Material Management Plan in accordance with Contaminated Land: Applications in Real Environments (CL:AIRE) guidelines. This MMP has been prepared to support the requirements of the CL:AIRE Definition of Waste: Industry Code of Practice (DoWCoP), Version 2 (CL:AIRE, 2011).

8.9.3 CL:AIRE is the current management organisation for the DoWCoP which sets out good practice for the development industry to use when assessing on a site-specific basis whether excavated materials are classified as waste or not; and when determining on a site-specific basis when treated excavated waste can cease to be waste for a particular use; and it describes an auditable system to demonstrate that this DoWCoP has been adhered to.

8.9.4 The scope of this MMP is to cover the Scheme. It will identify the information from the Scheme design and construction documentation to demonstrate the requirements of the CL:AIRE DoWCoP can be met.

8.9.5 At Key Stage 3 the earthworks strategy for the Scheme, and hence this MMP, is at an outline stage and will be developed further as the Scheme design progresses.

Overview of materials management plan

8.9.6 A variety of different materials will be required for the Scheme. The Scheme will be designed to minimise the volumes of the waste materials generated and of the imported construction materials, by reusing or recycling the existing materials available along the Scheme. The estimated material resources required for the project and the quantities and sourcing of materials has been listed in 1.8.

Table 8-8 List of materials required for the Scheme

Table to be populated by the Contractor. See ES Chapter 14 Materials for initial list

Project Activity	Material resources required for the project	Quantities of material resources required	Additional information on material resources
Earthworks	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
Site construction	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
Operation and maintenance of asset	Details	Details	Details
	Details	Details	Details
	Details	Details	Details
	Details	Details	Details

8.9.7 Earthworks estimates predict a deficit of approximately 75,000 m^3 of general earthworks materials, subject to appropriateness of the fill material. Where possible this material, and the other materials to be used as a part of the Scheme, will be obtained locally.

8.9.8 The Contractor shall ensure that materials are treated and used as set out in the MMP. At the completion of works, the Contractor shall provide evidence that materials have been treated and used in an acceptable manner.

Supporting Documentation

8.9.9 The information expected to be required to support the completion of an MMP for the Scheme would be drawn from the following documents, including other sections of this CEMP:

a) Invasive Species Management Plan;

b) Earthworks Strategy;

c) Land Contamination Management Strategy;

d) Remediation Strategy including a Verification Plan;

e) Earthworks Specification;

f) Cut/Fill requirements and Earthworks Movements Plan;

g) Design Statement I Remediation Strategy;

h) Qualified Person Declaration;

i) Verification Report; and

j) Proforma MMP.

8.9.10 The other supporting documentation listed will be prepared separately and references incorporated into the MMP as regulator agreement is obtained. The draft MMP will be reviewed and updated during detailed design of the proposed Scheme.

Summary

8.9.11 There is an intent to maximise the use of site-won materials for the construction of the proposed Scheme. Careful planning and procurement of imported materials would minimise the potential for waste. The Contractor is to plan for managing material through careful storage and recording, so that surplus can be retained for productive use or transferred to others.

8.10 Annexe H: Outline cultural heritage management plan

Introduction

8.10.1 A Cultural Heritage Management Plan (CHMP) shall be a live document prepared during the design stage and implemented during construction (Key Stage 6). The CHMP shall include, without limitation, the following:

a) procedures for advance works, set out in the Written Scheme of Investigation;

b) procedures for watching brief, set out in the Written Scheme of Investigation;

c) protection of archaeological features where this is considered necessary;

d) phasing of archaeological activities on site; and

e) production of archaeological reports.

8.10.2 This document is the Outline CHMP which begins the process at Key Stage 3 of identifying procedures and management of construction in relation to cultural heritage assets affected by the Scheme. This document shall be developed by the contractor, and the mitigation measures implemented during construction (Key Stage 6).

Purpose of the plan

8.10.3 The main purpose of the plan is to set out steps which the contractor is to take during construction to protect, record and investigate cultural heritage assets. It provides an overview of key Cultural Heritage aspects and features in the context of the Scheme and is a guide for construction management decisions.

8.10.4 The CHMP is based on information gathered from the Environmental Statement.

Description of Project

8.10.5 Refer to Environmental Statement Chapter 2.

Address of Project

8.10.6 Address of Site office: (to be inserted when identified)

Details of where this plan will be kept on site

8.10.7 The contractor will keep an up-to-date version of the CHMP on site throughout the construction stage. The CHMP should be kept at the main site office and uploaded to the Scheme website.

Table 8-9 CHMP details

Date site CHMP originally prepared	Contractor to populate
Project start date	Details
Project end date	Details
Estimated duration	Details
Client	Details
Principal contractor	Details
Originator	Details
Responsible party for ensuring compliance with CHMP	Details

Description of cultural heritage baseline

8.10.8 Refer to Environmental Statement Chapter 10.

Procedures for Advance Works (if required)

8.10.9 Before construction a programme of recording, sampling or investigation together with procedures for a Watching Brief will be agreed with the consultees, and the methodology set out in a Written Scheme of Investigation (WSI).

8.10.10 During topsoil strip, and any other activities requiring excavation, an archaeological watching brief will be maintained, in line with the Chartered Institute for Archaeologists Standard and Guidance for an Archaeological Watching Brief. As a minimum one archaeologist will be present on site at appropriate times, however where works are occurring concurrently in multiple locations, an archaeologist must be present at each location.

8.10.11 If unexpected archaeological remains are found, the following process will be followed:

a) excavation in that location will cease, save for any works required by the archaeologist to expose the area of interest fully;

b) the area of interest may require demarcation to prevent accidental damage before recording;

c) where feasible, excavation will continue outside the area of interest, under archaeological supervision;

d) the archaeologist will undertake recording of the archaeological remains through limited excavation, written and drawn records and photography;

e) if unexpected archaeological remains of particular significance are encountered, the local planning authority archaeological officer will be consulted regarding requirements for further recording;

8.10.12 Once archaeological recording has taken place, excavation can recommence under archaeological supervision.

Protection of Archaeological Features (if required)

8.10.13 All known features are either identified for investigation and removal or are considered too distant from the works boundary. Protection may be required if further features are found.

Phasing of Archaeological Activities on Site (if required)

8.10.14 To be added when the WSI is agreed.

Production of Archaeological Reports

8.10.15 Reports on investigations and the results of the archaeological watching brief will be produced as set out in the WSI. If archaeology of particular interest is identified, publication in appropriate professional journal may be required by the consultees.

Monitoring and review

8.10.16 The Contractor is to allow arranged access for the works to be monitored and reviewed by the relevant local planning authority or Clwyd-Powys Archaeological Trust staff.

Appendices and maps

8.10.17 At the outline stage, the cultural heritage assets are identified in ES Chapter 10.

8.10.18 These will be developed during the detailed design and final figures are to be provided in the final CHMP.

8.11 Annexe I: Outline ecological management plan

Introduction

8.11.1 Appropriate measures will be adopted to protect the ecology of the site with special attention to specified ecological resources, as identified by the Environmental Assessment. A full detailed Ecological Management Plan will be produced as part of the CEMP during the detailed design stage of the Scheme.

8.11.2 The important receptors to be considered and protected through the implementation of the Final CEMP are set out in the Environmental Statement Chapter 8.

8.11.3 Environmental mitigation forms part of the design and will be implemented by the contractor within the works.

8.11.4 Detailed method statements recognising ecological constraints will be prepared by the contractor. Works within the scope of European Protected Species Licences

and Marine Licences shall follow the conditions and methods set out in those licences.

8.11.5 The contractor will reduce any habitat loss within the land provided for the Project, by keeping the working area to the minimum practicably required for construction of the Scheme.

Measures to reduce potential impacts on ecological resources

8.11.6 Management measures for potential ecological impacts are addressed in other sections of the Outline-CEMP and are not repeated here. These include measures relating to:

a) Outline Invasive species control and management (see Annex C);

b) Outline Pollution control and prevention (see Annex D); and

c) Outline Ground and surface water management (see Annex F).

Pre-construction Surveys

8.11.7 Before the construction phase of the Scheme, pre-construction surveys will be undertaken in accordance with best practice guidelines where information is incomplete or not up to date. These surveys will include:

a) Otter presence / activity within the Scheme footprint

b) Bat roosts within trees affected by the Scheme

c) Pre-demolition surveys for bats of structures to be demolished

d) Nesting bird checks if the removal of vegetation and structures is within the nesting bird season (generally March – August but can be longer depending upon seasonal weather)

e) Badger presence /activity within the Scheme footprint

f) Pre-construction and site clearance checks for water voles within any ditches to be affected

8.11.8 The results of the pre-construction surveys will be reviewed to determine, in conjunction with the Statutory Environmental Bodies, whether further protected species licences are required.

8.12 Annexe I: Outline ecological management plan

Introduction

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8.12.2 The important receptors to be considered and protected through the implementation of the Final CEMP are set out in the Environmental Statement Chapter 8.

8.12.3 Environmental mitigation forms part of the design and will be implemented by the contractor within the works.

8.12.4 Detailed method statements recognising ecological constraints will be prepared by the contractor. Works within the scope of European Protected Species Licences and Marine Licences shall follow the conditions and methods set out in those licences.

8.12.5 The contractor will reduce any habitat loss within the land provided for the Project, by keeping the working area to the minimum practicably required for construction of the Scheme.

Measures to reduce potential impacts on ecological resources

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a) Outline Invasive species control and management (see Annex C);

b) Outline Pollution control and prevention (see Annex D); and

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b) Bat roosts within trees affected by the Scheme

c) Pre-demolition surveys for bats of structures to be demolished

d) Nesting bird checks if the removal of vegetation and structures is within the nesting bird season (generally March – August but can be longer depending upon seasonal weather)

e) Badger presence /activity within the Scheme footprint

f) Pre-construction and site clearance checks for water voles within any ditches to be affected

8.12.8 The results of the pre-construction surveys will be reviewed to determine, in conjunction with the Statutory Environmental Bodies, whether further protected species licences are required.

Procedures for Demolition and Vegetation Clearance

8.12.9 Where possible, vegetation clearance will be undertaken outside the bird breeding season (March to September). Within this season, survey for breeding birds will be conducted before clearance or disturbance. Irrespective of the timing, all vegetation will be searched by an ecologist before clearance to identify the presence of any legally protected or notable species.

8.12.10 If legally protected species or their resting places are encountered during vegetation clearance works, vegetation clearance will where necessary be suspended and licences obtained, before further clearance.

8.12.11 Amphibians, reptiles, hedgehogs, or Section 7 species (as listed in Environment Act Wales 2016) encountered will be carefully moved out of the construction areas to suitable receptor areas outside of the construction footprint. Within grassland

areas, the height of the sward will be reduced in stages within the construction area to encourage animals to move out of the footprint of the Scheme. The use of this method may vary depending on the time of year and ambient temperatures.

Procedures for draining of waterbodies

8.12.12 Where waterbodies are required to be in-filled or re-profiled, they will be drained down under the supervision of an ecologist. Checks for the presence of water voles will be conducted prior to dewatering, if evidence is found, the ecologist will advise the way forward. As water levels decrease the speed of dewatering will be slowed to allow any fish or amphibians to be removed to suitable receptor locations. Where possible aquatic vegetation from drained waterbodies will be placed on the banks of retained waterbodies for a minimum of 24 hours to allow invertebrates to move out of the vegetation.

8.12.13 Care will be taken during the draining of waterbodies to adhere to the requirements in relation to invasive aquatic plant species of the outline invasive species management plan in Annexe C.

Procedures for working near the River Dee

8.12.14 The contractor is to establish a programme of site inspection to ensure that passage along the River Dee banks for Otters is maintained and the site is kept free of litter or discarded food items.

8.12.15 No materials, packaging or other items which could fall, blow or wash into the river are to be left unsecured during the works.

Ecological Compliance Audit

8.12.16 As required by European Protected Species (EPS) licences, a licence report will be submitted to NRW by the contractor on expiry of the licence, and at interim stages where appropriate.

8.12.17 The fulfilment of the mitigation commitments in the REAC will be audited following methods to be agreed with NRW and recorded in the REAC. Progress will be

reported to the ELG. REAC commitments extending beyond the contract period will be adopted by NMWTRA.

8.13 Annexe J: Bio-security risk assessment

Introduction

8.13.1 The contractor shall prepare a bio-security risk assessment to include the risks of introducing or spreading invasive species (refer to Annexe C) and the risk of introducing or spreading diseases which could affect habitats and species.

8.13.2 Biosecurity risks associated with works within the River Dee will be assessed as part of the Marine Licence for the works.

8.14 Annex K: Construction Traffic Management Plan

Introduction

8.14.1 The contractor shall prepare a plan for traffic management to minimise effects on the immediate surroundings, wider environment and residents / businesses.

8.15 Annex L: Demolition plan

8.15.1 The existing bridge is planned to be demolished once the replacement bridge is completed.

8.15.2 Without avoidance and mitigation the demolition of the bridge could be a source of potentially adverse effects on environmental receptors and residential amenity. The environmental effects arising during demolition will be temporary, short lived and shall be avoided or mitigated.

8.15.3 This Method Statement shall be developed by the contractor's demolition specialist to set out the programme, timescale, actions, temporary works and controls required to protect the environment.

8.15.4 The Method Statement will be required before demolition commences and will include the following elements which are intended to protect the environment and will be in addition to those elements required for health and safety:

A. A brief description of the surrounding environment, highlighting those elements of the environment that could be adverse affected by the demolition activities. The following aspects will demonstrate how these elements are to be protected and monitored.

B. A programme for demolition identifying start and finish dates and taking into account any environmental constraints such as seasonal limits, any requirements for lighting of the works and the start and finish times for each demolition activity.

C. Details of the method of demolition to be used setting out how the works will progress, and debris be removed.

D. Details of how the generation of dust will be avoided or contained to minimise adverse effects on the environment and residents and to avoid the spillage of demolition debris into the River Dee.

E. Details of plant and equipment to be used and the means of controlling noise.

F. Details of the use of any hazardous substances to be used and the means by which they will be applied to prevent debris entering the River Dee.

G. Arrangements for the protection of the public and the construction workforce against noise and hazardous substances, such as asbestos or other dust.

H. Details of arrangements for containment and recovery if pollution incidents occur.

I. Arrangements for the separation and disposal of waste.

Training and Environmental Awareness

8.15.5 Training is essential to ensure that the provisions of the Demolition Plan are implemented efficiently and effectively. The plan shall specify the requirements of environmental training and awareness for all project personnel involved in demolition to ensure they perform their designated tasks to an acceptable standard. Training and awareness program will include:

Site induction

- Familiarization with the site and environmental risks.
- EMP requirements and environmental measures being implemented.
- Method for reporting observations and implementing corrective actions.
- Emergency response.

Response to Non-Compliance

8.15.6 The system to be used for dealing with non-compliance will be described and made clear to all project workers

Paragraph Number(s)	Code	Objective	Mitigation Measure (Summary)	Responsibility	Time Scale	Monitoring	Associated Ref(s)
Geology & Soils							
1.4.1, 1.4.6	**GS1**	To return the temporary Site Compound area to its former use and quality after construction is complete.	The Site Compound area will be restored to agricultural land after construction. This will be governed by a Soils Management Plan (SMP).	Contractor	Aftercare Period	As per the Soils Management Plan (SMP) and a detailed aftercare plan with the objective of returning land with the same ALC grade.	GS4
1.4.2	**GS2**	To reinstate areas where the existing highway is removed.	Stretches of the existing highway that are replaced will be restored with grassland, shrub, and tree planting, requiring the importation of suitable soil forming materials.	Contractor	During Construction / Aftercare Period	Not specified in chapter.	
1.4.5	**GS3**	To provide a comprehensive framework for managing all environmental impacts during construction.	An Outline-CEMP will be developed into a full Construction Environmental Management Plan (CEMP) by the appointed Contractor.	Contractor	Pre-commencement	An auditing programme will be implemented to verify environmental performance.	RDa5, RDb4, PH2, ME1
1.4.6, 1.9.3	**GS4**	To protect soil structure and quality by ensuring correct handling, storage, and reinstatement procedures are followed.	A Soils Management Plan (SMP) will be included within the CEMP to ensure works follow guidelines such as Defra's Code of Practice, particularly for reinstating agricultural land.	Contractor	During Construction / Aftercare Period	Monitoring and aftercare requirements will be included within the SMP.	GS1
1.4.7	**GS5**	To protect the ground surface and soil structure in temporary work areas such as compounds and storage areas.	A proprietary geotextile membrane will be used to protect the existing ground condition, with a layer of inert crushed granular material placed on top to form temporary running surfaces.	Contractor	During Construction	Not specified in chapter.	
1.4.8	**GS6**	To ensure imported soil is fit for purpose and supports biodiversity.	Where topsoil importation is required for new earthworks, it will be selected in accordance with BS3882:2015 to ensure it provides suitable substrates for native plant species.	Contractor	During Construction	Not specified in chapter.	
1.4.9, 1.4.10	**GS7**	To prevent pollution of controlled waters (aquifers and surface water) from general site activities.	Site drainage will be carefully managed to control silt. Stockpiles will be located away from watercourses, and on-site treatment plants will be available if needed.	Contractor, with oversight by Environmental Clerk of Works	During Construction	Works will be monitored by a suitably qualified Site Environmental Clerk of Works, responsible for identifying and approving all pollution control methods.	

1.4.10b, 1.4.10c	**GS8**	To manage excavated soils correctly and prevent dust, erosion, and cross-contamination.	Excavated topsoil and subsoils will be managed per the SMP, with clear segregation, dust suppression, and covers for stockpiles. Long-term stockpiles may be seeded.	Contractor	During Construction	Not specified in chapter.	AQ2, AQ3
1.4.11	**GS9**	To prevent the creation of pollution pathways into groundwater during foundation works.	Piling and penetrative ground improvement will follow EA guidance. In contaminated areas, a foundation works risk assessment will be done to identify appropriate measures, such as pile design selection and use of temporary casing.	Contractor / Designer	During Construction	Not specified in chapter.	RDa20, RDb3
1.4.12	**GS10**	To prevent soil and water contamination from concrete and chemical use.	Appropriate measures will be included in the Contractor's method statement, including batching concrete in designated impermeable areas, using temporary bunds to contain spills, and developing a spill response protocol.	Contractor	During Construction	Not specified in chapter.	RDa17, RDb6
1.4.13, 1.4.16	**GS11**	To ensure water removed from excavations is managed correctly to prevent pollution upon discharge.	Water from dewatering will be managed on-site using appropriate treatment prior to discharge.	Contractor	During Construction	Not specified in chapter.	
1.4.14	**GS12**	To prevent pollution from construction plant, fuels, and hazardous materials.	Measures include storing hazardous substances in bunded areas, using designated refuelling areas on hardstanding, regular plant inspections, use of drip trays, and providing spill kits and training.	Contractor	During Construction	Regular inspections of site plant will be carried out.	RDa16, RDb7, MW9
1.4.14d	**GS13**	To prevent soil erosion and the transfer of site soils onto public roads.	Wheel washing facilities with a washwater treatment system will be used, and best practice dust suppression methods will be employed on-site.	Contractor	During Construction	Not specified in chapter.	AQ5
1.4.15	**GS14**	To prevent accidental damage to land and soils outside the designated work area.	Areas outside the development boundary will be protected by temporary fencing to prevent accidental encroachment.	Contractor	During Construction	Not specified in chapter.	
1.4.18, 1.9.1	**GS15**	To detail the required management actions for any identified or suspected contamination.	If contamination is present or suspected, a Remediation Strategy will be created to detail on-site treatment or off-site disposal requirements.	Contractor	Pre-commencement / During Construction	Monitoring requirements related to contaminated land will be included within the Remediation Strategy.	
1.4.20	**GS16**	To ensure excavated contaminated materials are handled correctly to protect human health and the environment.	A method statement will be developed for the control of excavation, separation, handling, storage, and on-site treatment of contaminated soils to minimise off-site disposal.	Contractor	During Construction	Not specified in chapter.	

1.4.21	**GS17**	To protect construction and maintenance workers from risks associated with contaminated materials.	Contractor will undertake specific risk assessments to identify risks and appropriate mitigation measures in line with health and safety legislation.	Contractor	During Construction	Not specified in chapter.	
1.4.22	**GS18**	To ensure all excavated material is correctly classified and managed in line with the waste hierarchy.	All material created on-site will undergo basic characterisation prior to reuse or disposal. This includes full characterisation of soils and Waste Acceptance Criteria (WAC) testing where necessary.	Contractor ("producer")	During Construction	Not specified in chapter.	MW2
Road Drainage & Water Environment							
7.7.4, 7.7.5, 7.9.41	**RDa1**	To manage highway runoff and improve existing local flooding issues.	East of the River Dee, runoff will be conveyed to a modified and regraded swale. On the northern side of the A494, a new vegetated swale will provide treatment.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	
7.7.6, 7.8.34, 7.9.2, 7.9.53	**RDa2**	To improve hydromorphological conditions and provide flood management for the Queensferry Drain.	The Queensferry Drain will be realigned to include approximately 288m of new open channel, replacing previously culverted sections, with a new pumping station and trash screen.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	LV5
7.7.7	**RDa3**	To prevent tidal water from entering the Queensferry Drain pumping station.	A non-return flap valve will be installed on the new Queensferry Drain outfall.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	
7.7.8	**RDa4**	To inform detailed design and ensure environmental constraints are managed.	Prior to construction, an investigation of underlying deposits will be conducted where infrastructure is to be located.	Contractor	Pre-commencement	Not specified in chapter.	
7.7.9, 7.7.10	**RDa5**	To ensure good working practices are followed to manage environmental risks to the water environment.	A detailed Construction Environmental Management Plan (CEMP) will be completed by the contractor, incorporating good practice guidance (e.g., CIRIA, GPPs).	Contractor	Pre-commencement, During Construction	An auditing programme will be implemented to verify environmental performance.	GS3, RDb4, PH2, ME1
7.8.12a	**RDa6**	To manage sediment loads and pollution in construction runoff.	Runoff will be controlled during construction through suitable drainage, including the incorporation of Sustainable Drainage Systems (SuDS).	Contractor	During Construction	Not specified in chapter.	RDb13, RDd3
7.8.12b	**RDa7**	To manage flood risk during construction and prevent mobilisation of materials by floodwaters.	An onsite flood risk management plan will be created, including safe siting of facilities/storage and a flood forecasting strategy to inform daily works planning.	Contractor	During Construction	Not specified in chapter.	
7.8.12c	**RDa8**	To prevent pollution of watercourses from sediment in pumped water.	All pumped drainage from construction works and material storage areas will pass through silt settlement treatment prior to discharge.	Contractor	During Construction	Not specified in chapter.	
7.8.12d, 7.8.38b	**RDa9**	To minimise disturbance to riverbed sediment during construction.	Barge movements will be carried out to avoid the need for bed ploughing.	Contractor	During Construction	Not specified in chapter.	
7.8.12e, 7.8.38c	**RDa10**	To reduce sediment mobilisation during the installation of temporary works.	Temporary piles for the construction pier are planned to be installed from the bank during low tide.	Contractor	During Construction	Not specified in chapter.	
7.8.12f	**RDa11**	To prevent fuel spills in refuelling areas.	Plant nappies will be used around refuelling areas.	Contractor	During Construction	Not specified in chapter.	

7.8.12g, 7.8.28	**RDa12**	To contain disturbed sediments and limit water ingress during borehole creation.	Steel casing tubes will be installed into the riverbed to seal boreholes.	Contractor	During Construction	Not specified in chapter.	
7.8.12h	**RDa13**	To reduce the risk of contamination from drilling fluids.	Displaced drilling fluids (e.g., polymer, bentonite) will be pumped off and recycled.	Contractor	During Construction	Not specified in chapter.	
7.8.12i	**RDa14**	To prevent debris from demolition entering the river.	During demolition, crash decks will be installed beneath the existing bridge to capture debris.	Contractor	During Construction	Not specified in chapter.	
7.8.12j, 7.8.27	**RDa15**	To ensure sediment-laden water from excavations is handled correctly.	Wastewater from dewatering activities will be appropriately managed and disposed of in line with permits and will not be left as standing water in excavations.	Contractor	During Construction	Not specified in chapter.	
7.8.12k	**RDa16**	To ensure a rapid and effective response to any pollution incidents.	The construction team will be trained in pollution response, and spill kits will be distributed throughout the site, including in all plant and vehicles.	Contractor	During Construction	Not specified in chapter.	GS12, RDb7
7.8.12l	**RDa17**	To prevent contamination from concrete works.	Concrete mixing and washing areas will be contained and sited at least 10m from drainage channels. Concrete for piers will be delivered via a watertight tremie pipe.	Contractor	During Construction	Not specified in chapter.	GS10, RDb6
7.8.19	**RDa18**	To minimise disruption to groundwater flow and recharge from earthworks.	Excavation and dewatering will be completed as quickly as practicable, and ground compaction will be minimised where possible.	Contractor	During Construction	Not specified in chapter.	
7.8.38d	**RDa19**	To prevent sediment entering the watercourse during abutment installation.	Temporary sheet piling is anticipated during installation of the abutments to separate construction works from the watercourse.	Contractor	During Construction	Not specified in chapter.	
7.8.38g	**RDa20**	To minimise disturbance to the river's hydromorphological conditions.	Piling activities will be carried out in line with a piling risk assessment.	Contractor	During Construction	Not specified in chapter.	GS9, RDb3
7.8.38h	**RDa21**	To support the recovery of morphological conditions post-construction.	Where possible, like-for-like or improved habitat will be reinstated following construction.	Contractor	Aftercare Period	Not specified in chapter.	RDb5
7.9.23	**RDa22**	To encourage natural recolonisation of saltmarsh habitat under the new bridge.	The existing concrete revetment under the bridge will be removed or altered (e.g., by excavation, coring, and adding geotextiles) to create a growing medium for plants.	Contractor	During Construction	Not specified in chapter.	RDb11
7.9.40	**RDa23**	To provide pollution control for runoff discharging into the Queensferry Drain.	Swales and penstocks are proposed for the Queensferry Drain to provide treatment and containment for runoff.	Designer	Design Phase	Not specified in chapter.	
7.9.51	**RDa24**	To ensure the Queensferry Drain pumping station can operate during flood events.	The pumping station will be designed to be flood-resilient, with electrics and control kiosks located above floodwater levels.	Designer	Design Phase	Not specified in chapter.	RDd2
7.10.42	**RDa25**	To compensate for the significant operational effect of direct loss of saltmarsh habitat.	An offsite compensation area of 1.35 hectares at Greenfield Marsh will be enhanced by removing patches of rubble to encourage natural colonisation of saltmarsh habitat.	Welsh Government, in collaboration with FCC and NRW	Operational Phase	Not specified in chapter.	TB11, ME11
Road Drainage & Water Environment - WFD							
Table 6-1	**RDb1**	To minimise disturbance of riverbed sediment during construction.	All barge movements and piling will be carried out to minimise silt disturbance.	Contractor	During Construction	Not specified in chapter.	
Table 6-1	**RDb2**	To minimise flow disruption during the construction of in-channel piers.	In-channel works will allow for the containment of arisings without the need to form dry working areas around the piers, using a jack-up barge.	Contractor	During Construction	Not specified in chapter.	

Table 6-1	**RDb3**	To minimise disturbance from piling on the river's hydromorphology and to prevent sediment from entering the watercourse.	Piling activities will follow a piling risk assessment. Temporary sheet piling will be used during abutment installation to separate works from the watercourse.	Contractor	During Construction	Not specified in chapter.	GS9, RDa20
Table 6-1	**RDb4**	To ensure all construction works are managed according to good practice to prevent pollution.	The contractor will manage construction works in accordance with the CEMP, which incorporates Guidance for Pollution Prevention (GPPs).	Contractor	Pre-commencement, During Construction	Not specified in chapter.	GS3, RDa5, PH2, ME1
Table 6-1	**RDb5**	To support the recovery of morphological conditions after construction.	"Where possible, like for like or improved habitat will be reinstated following construction to support morphological conditions."	Contractor	Aftercare Period	Not specified in chapter.	RDa21
Table 6-1	**RDb6**	To prevent contamination of the water body from concrete works.	"Concrete will be placed for the permanent piles in steel casings to prevent loss into water and concrete will be delivered to the piles using a tremie (watertight) pipe..."	Contractor	During Construction	Not specified in chapter.	GS10, RDa17
Table 6-1	**RDb7**	To prevent pollution from fuel and chemical spills.	Fuel and chemicals will be stored in designated bunded areas, and emergency spill kits will be available.	Contractor	During Construction	Not specified in chapter.	GS12, RDa16, MW9
Table 6-1	**RDb8**	To minimise disturbance to migrating fish from in-river construction noise and activity.	In-river working (e.g., pile casing installation) will be restricted to 08:00-17:00 and will not occur within the 3-hour period leading up to high tide at Chester Weir.	Contractor	During Construction	Not specified in chapter.	ME3
Table 6-1	**RDb9**	To minimise noise, vibration, and light disturbance to fish and otters.	A soft-start approach will be used for piling. Lighting will be switched off outside working hours (8am-5pm), and security lighting will be minimised.	Contractor	During Construction	Not specified in chapter.	ME4, ME5
Table 6-1	**RDb10**	To protect eels or other fish species during the diversion of the Queensferry Drain.	Should eels or other fish species be identified as present the contractors should consult the Ecological Clerk of Works (ECOW) to determine if fish rescue should be carried out.	Contractor, Ecological Clerk of Works (ECOW)	During Construction	Pre-diversion assessment for fish presence.	
Table 6-1	**RDb11**	To encourage natural recolonisation of vegetation on the riverbank under the existing bridge area.	The concrete revetment on the north-eastern bank will be removed or adapted to create a growing medium for plants.	Contractor	During Construction / Aftercare Period	The area should be included in an environmental monitoring and management plan.	RDa22
Table 6-1	**RDb12**	To prevent the introduction and spread of Invasive Non-Native Species (INNS).	A biosecurity plan will be included in the CEMP, requiring "clean, check and dry" procedures for all equipment that has been in contact with other water bodies.	Contractor	During Construction	Not specified in chapter.	TB13, ME8
Table 6-2	**RDb13**	To improve water quality in the River Dee through enhanced drainage treatment.	The drainage network will incorporate SuDS, including a vortex separator, penstock devices, and a vegetated open channel for the reinstated Queensferry Drain to filter sediments and contain pollutants.	Designer	Design Phase	Not specified in chapter.	RDa6, RDd3
Table 6-2	**RDb14**	To minimise the risk of fish entrapment at the new Queensferry Drain pumping station.	Trash screen design (appropriate mesh size and spacing) will consider the passage of fish and water intake velocities to minimise risk to fish.	Designer	Design Phase	Not specified in chapter.	
Table 6-3	**RDb15**	To ensure regulatory compliance for dewatering activities.	The Contractor will obtain a discharge permit for any groundwater dewatering activities.	Contractor	Pre-commencement	Not specified in chapter.	
Table 6-3	**RDb16**	To prevent capped temporary piles from becoming future sources of contamination or obstruction.	Temporary piles for the platform and jetty will be removed and capped.	Contractor	Aftercare Period	Not specified in chapter.	

Table 6-4	**RDb17**	To reduce the risk of permanent piles creating vertical pollution pathways.	"The permanent piles will be capped upon completion of construction which will reduce the risk of preferential pathways for contaminants."	Contractor	During Construction	Not specified in chapter.	
Road Drainage & Water Environment - HEWRAT							
3.3.2	**RDc1**	To increase the capacity of the Garden City Swale and improve its drainage function.	The southern bank of the Garden City Swale will be reprofiled to increase its capacity.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	
Table 3-7	**RDc2**	To provide treatment for road runoff discharging to the Queensferry Drain to reduce pollutant and sediment concentrations.	A vegetated ditch will be utilised as a mitigation measure for the Queensferry Drain outfall, improving sediment (including copper and zinc) removal efficiency.	Designer	Design Phase, Operational Phase	Not specified in chapter.	
Table 3-7	**RDc3**	To provide a high level of treatment for road runoff discharging to the Garden City Swale.	A swale/grassed channel will be used to treat runoff, improving sediment (including copper and zinc) removal efficiency.	Designer	Design Phase, Operational Phase	Not specified in chapter.	
Road Drainage & Water Environment - FCA							
6.5, 8.2	**RDd1**	To ensure procedures are in place to manage flood risk to road users during extreme events.	The existing local contingency plan for highway incidents will be reviewed and updated once the Scheme is operational to set out procedures, roles, and triggers for managing flood events.	NMWTRA (in consultation with stakeholders)	Pre-commencement / Prior to operation	Not specified in chapter.	CC6
6.6, 8.1	**RDd2**	To ensure the Queensferry Drain pumping station remains operational and maintainable during flood events.	"The new Queensferry Drain pump station will be designed with electrics and control kiosks located above floodwater levels to ensure that they remain operational and maintainable during times of flooding."	Designer	Design Phase	Not specified in chapter.	RDa24
7, 8.1	**RDd3**	To manage surface water runoff from the scheme using Sustainable Drainage Systems (SuDS) to prevent increasing flood risk elsewhere.	The drainage design will include SuDS features such as approximately 288 metres of vegetated open channels and a 250-metre swale, along with trash screens, penstock control chambers, and a vortex separator.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	RDa6, RDb13
8.2	**RDd4**	To ensure regulatory approval for works in, over, under, or adjacent to Main Rivers.	A Flood Risk Activity Permit (FRAP) will be obtained for the works as required by the Environmental Permitting (England and Wales) Regulations 2016.	NMWTRA / Contractor	Pre-commencement	Not specified in chapter.	
Terrestrial Biodiversity							
8.5.2, 8.5.3	**TB1**	To manage environmental and ecological risks during construction.	An outline ecological management plan and pollution control measures will be prepared in line with GPP 5 and GPP 6.	Contractor	Pre-commencement, During Construction	The CEMP will require regular updates and revisions. An Environmental Co-ordinator (ECO) and Environmental Clerk of Works (ECOW) will oversee implementation.	ME1, MW6, MW7

8.5.4, 8.5.5	**TB2**	To ensure the ecological baseline is current and to check for protected species before works commence.	Pre-commencement site walkovers and surveys will be carried out to maintain the validity of the baseline data and check areas immediately before works.	Contractor / Ecologist	Pre-commencement	Not specified in chapter.	ME2
8.5.8.a, 8.7.51	**TB3**	To avoid harming or disturbing nesting birds during site clearance.	The clearance of trees, shrubs and hedgerows would be undertaken outside the bird nesting season (typically March to August). If this is not achievable, habitat will be checked by an ecologist prior to removal.	Contractor, with oversight by an ecologist	During Construction	If a nest is found, an appropriate exclusion zone will be established until young have fledged.	
8.5.8.b, 8.5.8.c, 8.5.8.d	**TB4**	To protect and safely displace amphibians and reptiles from the work area before clearance.	Reasonable Avoidance Measures including staged strimming of vegetation, fingertip searches, and hand-searching of reptile refugia will be undertaken before earthworks commence.	Contractor, under ecological supervision	During Construction	Not specified in chapter.	
8.5.8.e	**TB5**	To protect aquatic species during de-watering activities.	Ecological supervision will be provided during de-watering works within the Queensferry Drain.	Contractor / Ecologist	During Construction	Not specified in chapter.	
8.5.8.f	**TB6**	To avoid disturbing bats during their sensitive hibernation period.	The demolition of buildings where bat roosts have been discovered will be timed to avoid the winter hibernation period.	Contractor, under ecological supervision	During Construction	Not specified in chapter.	
8.5.8.g	**TB7**	To maintain ecological connectivity for wildlife during and after construction.	Vegetation and habitats identified for retention will be maintained and protected throughout the construction and aftercare period.	Contractor	During Construction and aftercare period	Not specified in chapter.	LV1, LV7
8.5.9.a, 8.5.9.e, 8.6.9	**TB8**	To mitigate habitat loss and enhance biodiversity and connectivity.	New landscape planting will be established, including linear habitats like hedgerows, native woodland, wildflower verges, and swales as shown on the Environmental Masterplan.	Designer, Contractor	During Construction, Aftercare Period	The establishment of landscape elements will be monitored during construction and a five-year aftercare period.	LV2
8.5.9.b, 8.5.9.c, 8.5.10-8.5.12, 8.8.28	**TB9**	To minimise light pollution on sensitive habitats and species, particularly along the River Dee and bat corridors.	A sensitive lighting design will be implemented, using directional luminaires, rear shielding, low output, and warm spectrum LEDs to reduce light spill.	Designer	Design Phase, Operational Phase	Not specified in chapter.	LV4, ME9
8.5.9.f, 8.5.13-8.5.17, 8.6.37, 8.6.38	**TB10**	To compensate for the loss of identified bat roosts.	Replacement roosts will be provided, including three free-standing pole-mounted bat boxes and a new purpose-built roost building of like-for-like construction, located close to destroyed roosts.	Designer, Contractor	During Construction	Post-construction monitoring of the new roosts will be carried out for a five-year period as part of the EPS licence requirements.	
8.5.18-8.5.20	**TB11**	To compensate for the permanent loss of saltmarsh habitat resulting from the new bridge construction.	The condition of existing saltmarsh at Greenfield Marsh will be improved to offset the habitat lost at the bridge location.	Designer, Other (Welsh Government)	Operational Phase	Not specified in chapter.	RDa25, ME11
8.5.21, 8.8.31	**TB12**	To enhance habitat connectivity for nocturnal wildlife, particularly bats.	A 'dark corridor' will be established by planting two new native hedgerows running parallel to a shared use path on what is currently arable land.	Designer, Contractor	During Construction	Not specified in chapter.	
8.5.22, 8.7.30	**TB13**	To prevent the spread of Invasive Non-Native Species (INNS).	Biosecurity measures will be implemented, including toolbox talks, limiting access points to water bodies, and ensuring equipment is carefully cleaned.	Contractor	During Construction	Not specified in chapter.	RDb12, ME8

8.6.14, 8.7.36	**TB14**	To protect badgers and their setts from construction disturbance.	Pre-construction surveys for badgers will be conducted. An exclusion zone with a 30m buffer will be established around active setts.	Contractor, under ecological supervision	Pre-commencement, During Construction	Camera traps will be installed to monitor badger movement where required.	
8.6.14, 8.7.37	**TB15**	To ensure legal compliance for any works that may disturb badger setts.	If works are required within 30m of an active badger sett, a licence will be obtained from NRW.	NMWTRA / Contractor	Pre-commencement	As per licence conditions.	
8.6.32, 8.6.36	**TB16**	To ensure legal compliance for the demolition of buildings containing bat roosts.	An European Protected Species (EPS) development licence will be obtained from NRW prior to the demolition of any buildings with confirmed bat roosts.	NMWTRA / Contractor	Pre-commencement	Monitoring will be carried out as required by the licence method statement.	
8.7.52, 8.7.62	**TB17**	To minimise noise disturbance to wildlife during construction.	Good industry practice (BS 5228-1:2009+A1:2014) will be implemented, including using quieter equipment and noise attenuation measures like silencers or enclosures where practicable.	Contractor	During Construction	Not specified in chapter.	NV2
8.7.67	**TB18**	To maintain habitat connectivity for bats during construction where temporary habitat loss occurs.	Where linear vegetation is lost, temporary flightlines would be considered to retain habitat connectivity during the construction period.	Contractor	During Construction	Not specified in chapter.	
8.8.14	**TB19**	To reduce the risk of amphibians being trapped in the new drainage system.	Where possible, amphibian-friendly drainage details, such as wildlife kerbs and modified gully pots, will be incorporated into the design.	Designer	Design Phase	Not specified in chapter.	
8.9.7	**TB20**	To ensure the successful establishment of landscape and ecological elements post-construction.	A five-year aftercare period will be implemented, governed by a Handover Environmental Management Plan (HEMP), to manage the soft estate.	Contractor	Aftercare Period	Monitoring of landscape elements.	LV8, ME12
8.9.8	**TB21**	To confirm the continued use of the river corridor by otters after construction is complete.	An otter survey will be conducted once the Scheme is complete to monitor activity.	Contractor / Ecologist	Aftercare Period	Otter survey to be undertaken and results reported.	ME12
Landscape & Visual							
9.5.5.b, 9.5.6.b, 9.5.15	**LV1**	To minimise the loss of established landscape features and character.	Retain and protect existing vegetation where it provides a visual screen function within the constraints of the design. This should include protection from damage by utilities.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	TB7, LV7
9.5.5.f, 9.5.6.c, 9.5.18, 9.5.21, 9.5.32	**LV2**	To minimise visual intrusion of the scheme on nearby properties and public spaces.	New planting will be established to screen, integrate, and enhance the scheme. This includes reinforcing existing vegetation on embankments to provide separation and visual barriers. This should include the routing of new or diverted utilities to avoid damage to proposed areas of planting.	Designer, Contractor	During Construction, Aftercare Period	Monitored annually during the aftercare period to assess whether screening height will be achieved by the Design Year.	TB8
9.5.6.e, 9.5.8.a, 9.5.17	**LV3**	To ensure new planting reflects local character and enhances biodiversity and habitat connectivity.	Native planting and seeding using species of local provenance will be used to create species-rich areas, hedgerows, and corridors that link to existing landscape features.	Designer, Contractor	During Construction, Aftercare Period	Monitored annually during the aftercare period to ensure plant establishment meets performance requirements.	

9.5.6.g	**LV4**	To reduce the visual clutter and light spill from road infrastructure.	Use lighting with low spillage and carefully consider the design and siting of road signs, traffic signals, environmental barriers, and street furniture.	Designer	Design Phase	Not specified in chapter.	TB9, ME9
9.5.16, 9.5.17	**LV5**	To improve active travel connections and create new wildlife corridors.	A new shared-use path will be created, and the Queensferry Drain will be realigned into an open channel with its banks managed to encourage species-rich grassland.	Designer, Contractor	During Construction	Not specified in chapter.	RDa2
9.5.25	**LV6**	To mitigate traffic noise effects on residential properties and soften the visual appearance of the infrastructure.	An environmental barrier will be constructed at the top of the bridge approach embankment to mitigate noise impact on the gypsy traveller site, with replacement shrub planting on the south-facing slope to soften its appearance.	Designer, Contractor	During Construction, Operational Phase	Not specified in chapter.	
9.5.33	**LV7**	To ensure that existing landscape and ecological features designated for retention are not damaged during works.	During construction, existing features to be retained will be protected through the implementation of the Construction Environmental Management Plan (CEMP).	Contractor	During Construction	The Environmental Co-ordinator (ECO) and Environmental Clerk of Works (ECOW) will be responsible for overseeing the implementation of the CEMP.	LV1, TB7
9.5.34, 9.8.1, 9.8.3	**LV8**	To ensure the successful establishment of all new landscape and ecological planting.	A five-year aftercare period for landscape areas will be implemented to aid the establishment and growth of new planting and seeding to ensure it achieves the intended environmental functions.	Contractor, Maintaining Agent (NMWTRA)	Aftercare Period (Years 1-5), Design Year (Year 15)	Annual monitoring during the aftercare period will determine if sufficient growth is being achieved. A final monitoring visit by the Maintaining Agent at the Design Year will review mitigation.	TB20, ME12
Archaeology and Cultural Heritage							
10.6.3	**AC1**	To investigate and record archaeological evidence of the Aston Quay port components before their loss during construction.	A limited scale strip and record action will be undertaken during the site clearance phase to expose and record any surviving evidence of Aston Quay (Sites 48, 50, 51, and 53 on **Figure 10.2**).	Contractor / Archaeological Contractor	During Construction (Site Clearance Phase)	The archaeological investigation itself serves as the monitoring and recording process.	
10.6.4	**AC2**	To identify and record any previously unknown archaeological remains that may be uncovered during construction works.	"An archaeological watching brief would be undertaken on a targeted basis, focusing on specific impact types and locations. This may lead to a requirement for further archaeological investigation of any buried archaeological remains that are identified during the watching brief."	Contractor / Archaeological Contractor	During Construction	Not specified in chapter.	
10.6.5	**AC3**	To oversee and control the potential effects of construction activities on the setting of nearby Listed Buildings.	The project will include monitoring and oversight of the effects of construction on six specified Listed Building locations (Sites 8, 31, 61, 65, 66, and 69 on **Figure 10.1**).	Contractor / Environmental Clerk of Works	During Construction	Not specified in chapter.	

10.11.2	**AC4**	To ensure all archaeological findings are properly documented and made publicly accessible for future research.	All archaeological reports will be submitted as high-resolution digital PDFs to Heneb (Clwyd Powys Archaeology HER), and the full digital archive will be forwarded to the National Monuments Record (RCAHMW) and/or the Archaeology Data Service (ADS).	NMWTRA / Archaeological Contractor	Post-construction	Not specified in chapter.	
Air Quality							
11.7.1	**AQ1**	To reduce dust generation from material handling.	Materials on site will be managed to avoid spreading of airborne pollutants.	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ2**	To minimise wind-blown dust from material stockpiles.	The height of stockpiles will be minimised and they will be profiled to reduce wind-blown dust emissions and the risk of stockpile collapse.	Contractor	During Construction	Not specified in chapter.	GS8, AQ3
11.7.1	**AQ3**	To further reduce dust generation from stockpiles.	Stockpiles will be located out of the wind or be covered, seeded, or fenced to minimise the potential for dust generation.	Contractor	During Construction	Not specified in chapter.	GS8, AQ2
11.7.1	**AQ4**	To prevent dust emissions from vehicles transporting materials.	"Ensure that all vehicles with open loads of potential dusty materials are securely sheeted or enclosed."	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ5**	To prevent the track-out of mud and debris onto public roads.	A means of removing mud and debris from the wheels and chassis of vehicles leaving the site will be provided, such as a coarse gravel running surface, jet wash, or wheel washers.	Contractor	During Construction	Not specified in chapter.	GS13
11.7.1	**AQ6**	To prevent dust generation from vehicle movement on-site.	A low speed limit will be maintained on site for all vehicles.	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ7**	To suppress dust from haul routes and work areas.	Surfaces will be dampened down during dry conditions.	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ8**	To suppress dust at the source during specific construction activities.	Water will be sprayed during all cutting and grinding operations.	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ9**	To reduce unnecessary exhaust emissions from construction plant.	All vehicle engines and plant motors will be switched off when not in use.	Contractor	During Construction	Not specified in chapter.	
11.7.1	**AQ10**	To minimise dust impacts on sensitive receptors.	High dust-generating activities within site compounds will be located as far away from nearby receptors as possible.	Contractor	During Construction	Not specified in chapter.	
Noise & Vibration							
12.2.3, 12.5.10	**NV1**	To gain prior consent for construction works and agree on noise control measures with the local authority.	Where significant adverse effects are predicted, the Contractor will seek to obtain consent for works from Flintshire County Council (FCC) under Section 61 of the Control of Pollution Act 1974.	Contractor	Pre-commencement, During Construction	Not specified in chapter.	
12.5.3, 12.5.8, 12.5.11	**NV2**	To control construction noise and vibration through adherence to established good practice.	Construction will be controlled by implementing the principle of Best Practicable Means (BPM) as set out in BS 5228 Parts 1 and 2. This will be managed through a Construction Noise and Vibration Management Plan (CNVMP) within the CEMP.	Contractor	During Construction	Not specified in chapter.	TB17
12.5.5	**NV3**	To reduce noise disturbance at residential receptors during sensitive night-time hours.	"Night-time works which occur in close proximity to residential receptors will be minimised as far as practicable."	Contractor	During Construction	Not specified in chapter.	

12.5.6	**NV4**	To reduce noise from piling activities near sensitive receptors.	"Quieter piling techniques e.g. rotary bored piles and pressed-in "silent" piling will be considered where there is close approach of works to noise sensitive receptors."	Contractor	During Construction	Not specified in chapter.	ME6
12.5.7, 12.9.1	**NV5**	To reduce construction noise levels at sensitive receptors for works of a protracted duration.	Temporary noise barriers will be installed where practical for works of a protracted duration where significant adverse effects are likely. Barriers will be designed to break the line of sight to receptors.	Contractor	During Construction	Not specified in chapter.	
12.5.11i, 12.5.12	**NV6**	To ensure residents are informed and have a point of contact for any issues arising from construction noise.	Good public relations will be maintained by informing residents in advance of works, keeping them updated, and providing access to a Public Liaison Officer. A complaint handling procedure will be established.	Contractor / Public Liaison Officer	During Construction	Not specified in chapter.	
12.5.11k, 12.5.11l	**NV7**	To manage noise from construction traffic.	Deliveries will be managed to prevent queuing of site traffic at access points. Adjustable, directional, or white noise reversing alarms will be used on vehicles.	Contractor	During Construction	Not specified in chapter.	
12.5.14	**NV8**	To minimise disturbance from construction vibration.	Mitigation measures for vibration include utilising low vibration working methods, replacing plant causing significant vibration, and providing residents with advance notice of vibration-inducing activities.	Contractor	During Construction	Not specified in chapter.	
12.5.15	**NV9**	To maintain existing levels of acoustic shielding for receptors.	The existing road-side noise barriers, including the one adjacent to the eastbound carriageway east of the River Dee, will be retained.	Designer, Contractor	Design Phase, Operational Phase	Not specified in chapter.	
12.5.17	**NV10**	To mitigate operational traffic noise for residents of the gypsy traveller site.	"A new 2m high reflective noise barrier will be incorporated adjacent to the westbound carriageway, immediately to the west of the Dee Bridge, to provide acoustic shielding for the existing gypsy traveller site."	Designer, Contractor	Design Phase, Operational Phase	Not specified in chapter.	
12.5.18	**NV11**	To reduce operational traffic noise from the road surface.	"With the exception of the Dee Bridge deck, a low noise stone mastic asphalt (SMA) surface will be used for new surfaces within the Scheme extents."	Designer, Contractor	Design Phase, Operational Phase	Not specified in chapter.	
12.6.32	**NV12**	To manage noise from construction compounds and minimise disturbance to nearby residents.	Mitigation for compounds includes locating noisy activities away from receptors, using acoustic enclosures for plant (e.g., generators), installing temporary barriers, restricting delivery times, and appropriately siting access points.	Contractor	During Construction	Not specified in chapter.	
12.9.1	**NV13**	To control the duration of significant noise impacts on residents.	Where a significant adverse effect is predicted, noise will be controlled through scheduling of works to ensure the duration of impact does not exceed 10 days in any 15, or 40 days in any six months, where reasonably practicable.	Contractor	During Construction	Not specified in chapter.	
Materials & Waste							
13.5.2, 13.5.15	**MW1**	To formally identify and implement opportunities for efficient material use and waste reduction throughout the project lifecycle.	A Design for Resource Efficiency (D4RE) Opportunities Matrix will be maintained to record and implement measures such as using a single bridge design, recycled aggregates, and optimising earthworks to reduce material use.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	

13.5.4	**MW2**	To maximise the reuse of suitable site-won materials and minimise the need for imported fill and off-site disposal.	A Materials Management Plan (MMP) will be compiled by the contractor prior to works, identifying ways to reuse site-won materials within the scheme in line with the CL:AIRE Code of Practice.	Contractor	Pre-commencement, During Construction	Not specified in chapter.	GS18
13.5.5, 13.5.6, 13.8.3	**MW3**	To ensure waste is managed according to the waste hierarchy and to provide a framework for handling all waste streams, including potential contamination.	A full Site Waste Management Plan (SWMP) will be compiled by the contractor, detailing procedures to prevent waste generation, prioritise reuse/recycling, and manage contaminated materials if encountered.	Contractor	Pre-commencement, During Construction	The SWMP will include monitoring to avoid waste generation and prioritise reuse/recycling.	
13.5.9	**MW4**	To ensure legal compliance for off-site waste disposal and minimise transport impacts.	The contractor will ensure waste is taken only to permitted sites and will identify the closest relevant facilities to minimise transportation.	Contractor	During Construction	Not specified in chapter.	
13.5.10	**MW5**	To track waste generation and ensure performance against reuse and recycling targets.	The contractor will undertake waste audits throughout the construction phase and report on waste quantities, performance against targets, and opportunities for improvement.	Contractor	During Construction	The waste audits themselves constitute the monitoring activity.	
13.5.11	**MW6**	To prevent water pollution from silt, mud, and debris generated during construction.	The contractor will manage silt, mud, and debris to minimise risk of pollution to watercourses, in accordance with Natural Resources Wales Guidance for Pollution Prevention 5 (GPP5).	Contractor	During Construction	Not specified in chapter.	TB1, ME1, MW7
13.5.12	**MW7**	To ensure all construction, demolition, and waste import activities comply with environmental regulations.	All activities will be conducted in accordance with Natural Resources Wales Guidance for Pollution Prevention 6 (GPP6), including registering relevant activities with NRW.	Contractor	During Construction	Not specified in chapter.	TB1, ME1, MW6
13.5.13	**MW8**	To protect watercourses from the improper storage of materials.	No material will be deposited within 10m of watercourses without prior discussion with Natural Resources Wales (NRW).	Contractor	During Construction	Not specified in chapter.	
13.5.14	**MW9**	To prevent pollution from the storage of oils, fuels, or chemicals on site.	"Any facilities for the storage of oils, fuels or chemicals shall be sited on impermeable surfaces and surrounded by impermeable bund walls. The volume of the bunded compound shall be 110% of the capacity of the tank..."	Contractor	During Construction	Not specified in chapter.	GS12, RDb7
13.8.4	**MW10**	To limit deterioration of structures and reduce future waste generation from maintenance.	Inspections and maintenance will be conducted to limit the rate of structure deterioration and reduce the quantity of construction or paint material entering the environment over the long term.	Maintaining Agent	Operational Phase	Regular inspections and maintenance.	
Population & Human Health							
14.6.2	**PH1**	To maintain access and minimise disruption for residents, businesses, and community facilities during construction.	A Construction Traffic Management Plan (CTMP) will be implemented to ensure access is maintained and disruption is minimised as far as possible to all local land users.	Contractor	During Construction	Not specified in chapter.	
14.6.3	**PH2**	To control construction nuisances such as dust, noise, and visual intrusion that could impact human health and amenity.	A Construction Environmental Management Plan (CEMP) will be implemented, which will adopt mitigation measures to control construction dust, noise and visual effects.	Contractor	During Construction	Not specified in chapter.	GS3, RDa5, RDb4, ME1
14.6.4	**PH3**	To inform users of temporary changes to walking, cycling, and horse-riding (WCH) routes.	Appropriate signage for temporary WCH diversions, including wayfinding and duration of works will be provided.	Contractor	During Construction	Not specified in chapter.	

14.6.5	**PH4**	To reduce the impact of the scheme on high-quality agricultural land.	The area of agricultural land required for construction will be minimised, and land that is not 'best and most versatile' (BMV) will be preferentially used.	Designer, Contractor	Design Phase, During Construction	Not specified in chapter.	
14.6.7	**PH5**	To keep the local community and businesses informed of construction impacts and scheduling.	Engagement will be undertaken with local people and businesses, setting out how construction activities may impact them (e.g., through WCH closures and diversions).	Contractor / Public Liaison Officer	Pre-commencement, During Construction	Not specified in chapter.	
Climate Change & Greenhouse Gases							
17.7.1, 17.7.2, 17.7.3	**CC1**	To embed decarbonisation into the decision-making process and identify carbon reduction opportunities.	A Carbon Management Plan (CMP) will be maintained as a live document, updated as implementation of opportunities progresses through design development.	Designer, Contractor	Design Phase, During Construction	The CMP and opportunities log are live documents to be updated as the scheme progresses.	CC8
17.7.5	**CC2**	To reduce emissions from construction site machinery.	Plant, equipment, and vehicles used on the scheme will be selected based on their relative environmental performance and low emissions, as per technical specifications.	Contractor	During Construction	Not specified in chapter.	
17.7.8	**CC3**	To ensure the supply chain is aligned with carbon reduction goals.	A procurement strategy with carbon reduction at its core will be designed, including requirements for suppliers to hold PAS 2080 certification and the setting of a target carbon value for the project.	Designer, Applicant (Welsh Government)	Pre-commencement	Not specified in chapter.	
17.7.10	**CC4**	To ensure the scheme's structures are resilient to future climate change impacts such as high winds and extreme temperatures.	The scheme's design will be in line with the latest structural design codes, including BS EN 1991-1-1-4 for wind loads and BS EN 1991-1-5 for thermal actions. Power cables will be buried for protection.	Designer	Design Phase	Not specified in chapter.	
17.7.13	**CC5**	To ensure the long-term resilience of the scheme to climate impacts through proactive management.	The scheme will follow a maintenance and management regime (TRMM) including regular inspections, inspections after extreme events (e.g., 1-in-1000-year flood, gale force winds), and use of flood warnings.	Maintaining Agent (NMWTRA)	Operational Phase	Regular and post-event inspections of assets.	
17.7.13.viii	**CC6**	To ensure a coordinated response to flood events that may affect the highway.	A new Flood Emergency Plan will be developed to form part of the over-arching contingency plan for highway incidents.	NMWTRA	Pre-commencement / Prior to operation	Not specified in chapter.	RDd1
17.9.1	**CC7**	To ensure the scheme is prepared for hazardous weather events during both construction and operation.	Hazardous Weather Management Plans will be implemented, including trigger levels and response plans for storms, high temperatures, and heavy rainfall/flooding.	Contractor, Maintaining Agent (NMWTRA)	During Construction, Operational Phase	Not specified in chapter.	
17.10.1, 17.10.2	**CC8**	To track and manage the whole-life carbon footprint of the scheme and report on carbon reduction progress.	A post-construction carbon assessment will be undertaken to account for 'as-built' values. The live Carbon Management Plan will be updated and passed to Welsh Government.	Contractor, NMWTRA	Post-construction	The post-construction assessment and updated CMP will form the monitoring record.	CC1
Marine Environment							

16.5.2, 16.5.3	**ME1**	To manage environmental and ecological risks during construction.	A Construction Environmental Management Plan (CEMP) will be implemented, including an Ecological Management Plan (EcMP), with specific measures for pollution control in line with GPP5 and GPP6.	Contractor	Pre-commencement, During Construction	Not specified in chapter.	GS3, RDa5, RDb4, PH2, TB1, MW6, MW7
16.5.4, 16.5.5	**ME2**	To ensure the ecological baseline is current and to avoid impacts on species during sensitive periods.	Pre-commencement surveys will be carried out. Site clearance will consider seasonal environmental constraints to protect sensitive species.	Contractor / Ecologist	Pre-commencement, During Construction	Not specified in chapter.	TB2
16.5.9.a	**ME3**	To minimise disturbance to migrating fish, particularly at night when activity is generally higher.	In-river working (e.g., pile casing installation) will be restricted to daytime hours (08:00-17:00) and will not occur within the 3-hour period leading up to high tide at Chester weir.	Contractor	During Construction	Not specified in chapter.	RDb8
16.5.9.b	**ME4**	To avoid deterring the movement of fish and otters during night-time hours.	Lighting for works will be minimised outside working hours (08:00-17:00), and any required security lighting will also be minimised.	Contractor	During Construction	Not specified in chapter.	RDb9
16.5.9.c	**ME5**	To allow mobile marine species (fish and marine mammals) to move away from the noise source before piling commences.	A "soft-start" approach will be undertaken when using piling equipment, gradually increasing the intensity of the noise.	Contractor	During Construction	Not specified in chapter.	RDb9
16.5.9.d	**ME6**	To reduce underwater noise and vibration during piling.	Non-percussive piling techniques (e.g., rotary bored piling) will be used to install the piles.	Contractor	During Construction	Not specified in chapter.	NV4
16.5.9.f	**ME7**	To minimise the release of suspended particulates and noise into the watercourse during piling.	Bored piles will be constructed by positioning an auger inside pre-installed steel tubes, containing the silt and reducing vibration at the riverbed.	Contractor	During Construction	Not specified in chapter.	
16.5.10, 16.5.11	**ME8**	To prevent the introduction and spread of Invasive Non-Native Species (INNS).	A biosecurity plan will be included in the CEMP, requiring all equipment to be subject to "clean, check and dry" biosecurity measures before entering the water.	Contractor	During Construction	Not specified in chapter.	RDb12, TB13
16.5.14	**ME9**	To minimise light spill onto the River Dee and its banks, reducing disturbance to nocturnal wildlife.	Operational lighting will be designed to be sensitive, using directional luminaires with shielding to prevent light spill onto the river corridor.	Designer	Design Phase, Operational Phase	Not specified in chapter.	TB9, LV4
16.5.15	**ME10**	To protect the water quality of the River Dee from accidental pollution incidents during the operational phase.	Protection from accidental spillages will be provided by isolation systems within the drainage network, allowing pollutants to be contained for safe disposal.	Designer	Design Phase, Operational Phase	Not specified in chapter.	
16.7.1 - 16.7.3	**ME11**	To compensate for the permanent loss of saltmarsh habitat.	An offsite compensation area of 1.35 hectares at Greenfield Marsh will be enhanced by removing rubble to encourage the natural colonisation of saltmarsh habitat.	Welsh Government, in collaboration with FCC and NRW	Operational Phase	The area will be included in an environmental monitoring and management plan following construction.	RDa25, TB11
16.7.5, 16.7.6	**ME12**	To ensure the successful establishment of ecological mitigation and monitor impacts on protected species post-construction.	A five-year aftercare period will be implemented through a Handover Environmental Management Plan (HEMP). Monitoring will include an otter survey to confirm continued use of access under the new bridge.	Contractor, Maintaining Agent	Aftercare Period	Otter surveys to be conducted post-construction.	TB20, TB21, LV8

Llywodraeth Cymru / Welsh Government

A494 RIVER DEE BRIDGE REPLACEMENT

Environmental Statement

Volume 1: Technical Assessment Report

Chapter 18C: Environment Inspection, Service & Maintenance Manual (IS&M)

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1. Environment Inspection, Service and Maintenance Manual (IS&M)

1.1 Introduction

1.1.1 This document sets out the first iteration[1] of the soft estate maintenance and management plan for all environmental assets under the ownership of Welsh Government at the A494 River Dee Bridge Replacement Scheme, In Flintshire, North Wales.

1.1.2 The IS&M Manual will become active during the post construction and 60 month aftercare period. It will remain applicable for 15 years after handover.

1.1.3 The IS&M Manual is structured as follows:

1.0 **Introduction:** Brief introduction and background to the project and the IS&M manual

2.0 **Description of the Scheme** and its component parts

3.0 **Guidance documents:** A description and extracts from the key guidance documents.

4.0 **Inspection and maintenance requirements**: A description of the performance requirements for each component of the asset plus inspection and routine maintenance requirements in accordance with the guidance documents

1.2 Responsibilities

1.2.1 Following completion of the River Dee Bridge Replacement Scheme there will be a five year aftercare requirement on a contractor to ensure the soft estate and other environmental measures are complete, effective and that new vegetation is adequately established. The contractor will be responsible for preparing a management plan for the soft estate during the five years of aftercare. On

[1] DMRB LA120 Environmental management plans

completion of five years aftercare the Scheme will be handed over to Welsh Government's maintaining agent.

1.2.2 North and Mid Wales Trunk Road Agent (NMWTRA), or its successors, will take responsibility for long term maintenance of the Scheme responsible for managing, maintaining, and improving the strategic road network in North and Mid Wales on behalf of the Welsh Government, and is responsible for maintaining the condition and value of the Welsh Government's trunk road assets.

1.2.3 The relevant assets to this IS&M make up the soft estate which includes:

A. Highway verges.

B. Planted and grassed areas.

C. Established trees.

D. Biodiversity measures such as artificial nesting boxes and refugia.

E. Wildlife underpasses.

F. Fences

G. Wildlife barriers such as badger or otter fencing.

H. Drainage systems can include elements of the soft estate, such as ditches and swales

2. Description of the asset: A494 River Dee Bridge Replacement

2.1 Generally

2.1.1 The Scheme consists of a new replacement bridge of a similar length and width to that of the existing bridge to carry two lanes of eastbound and westbound traffic and a shared use path for cyclists and pedestrians. The replacement bridge is located approximately seven metres to the southeast of the existing A494 River Dee Bridge. On completion of the new bridge the old crossing deck will be demolished, but the existing piers will be retained.

2.2 Replacement bridge

2.2.1 The new bridge has a span of approximately 140 metres and a width of 36.5 metres, supported by two sets of river piers. Each river pier is constructed using 12 No. piles approximately 1.5 metres in diameter. The top surface of the bridge deck will be 6.5- 7.3 metres above the river level (Mean High-Water Spring - MHWS River Dee).

2.2.2 There are two lanes of traffic in each direction and a hard shoulder on both the east and westbound carriageway. A shared use path for active travel provision would run along the southern side of the bridge.

2.3 The A494 dual carriageway

2.3.1 Improvements to the existing A494, to the east of where it passes under the North Wales Coast Railway Line, include: a new hard shoulder in each direction connecting to the existing hard shoulders to the east of the River Dee; and sustainable drainage systems.

2.3.2 An access/exit slip road has been provided from the A494 towards the Riverside area just past the river crossing. An access (left in/left out) from the westbound carriageway of the A494 provides entry to the Riverside Gypsy Travellers site, commercial properties and to a new river pumping station.

2.4 Active Travel and shared use routes

2.4.1 The existing Wales Coast Path, part of the National Cycle Route (NCR 5), on the north-eastern bank of the River Dee now connects to a new shared use path across the River Dee and into Queensferry. A new shared use path for pedestrians and cyclists follows the southeast side of the westbound carriageway to connect with the Wales Coast Path and active travel routes in the area.

2.5 Public Rights of Way

2.5.1 Public rights of way have been modified, and existing footpaths, bridleways and private means of access have been diverted.

a) A footpath between B5441 Station Road and River Dee alongside the A494 eastbound carriageway, has been improved to allow for all users.

b) A Footpath on western bank of River Dee beneath existing bridge is now connected to the new path across the River Dee.

c) The Public right of way between Chemistry Lane / Factory Road junction and the River Dee is retained as part of the proposed new access road.

2.6 Changes to existing drainage

2.6.1 Diversion of the Queensferry Drain (a Natural Resources Wales main river on the southeast side of the A494) has been modified with sections of open channel either side of the railway with a section of existing culvert beneath the railway line retained. A river pumping station and drainage outfall to the River Dee has been constructed.

2.7 Components of the soft estate

2.7.1 The Scheme has following environmental mitigation; biodiversity enhancements and other designed components:

i) Earthworks

ii) Surface water drainage including swales

iii) Tree and shrub planting

iv) Grassland with large areas of wildflower seeding and spring bulbs

2.7.2 The component parts of the asset are described in Section 4 along with the Performance Requirements (PR), Inspection Requirements (IR) and the Maintenance Requirements (MR) for each component part as prescribed by WGTRMM.

3. Guidance documents

3.1 This manual

3.1.1 This document has been prepared in accordance with the following published guidance:

3.2 Design Manual for Roads and Bridges (DMRB)

CD 522 Drainage of runoff from natural catchments Revision 0:

Provides requirements and advice for dealing with surface water runoff from natural catchments draining towards motorways or all-purpose trunk roads, in order to limit the frequency and severity of flooding incidents caused by runoff from beyond the highway boundary. All runoff from natural catchments draining to the road shall be intercepted and prevented from entering the road drainage network.

CD 532 Vegetated drainage systems for highway runoff Version 0.1.0:

Gives the requirements and advice for the design of vegetated drainage systems to convey, store and treat runoff from motorways and all-purpose trunk roads. They are described as vegetated drainage systems because they contain a significant element of vegetation. The guidance requires a Maintenance Programme to be defined to ensure continued capacity of the drainage system.

GD 304 Designing health and safety into maintenance: Section 1 &2:

Health and safety risk for all highway works should be managed throughout the whole life of the activity. The assessment of risk in the design process, includes consideration of maintenance to achieve safety improvements and whole life cost savings.

GG 182 Major schemes: Enabling handover into operation and maintenance:

The process to be adopted in the planning and delivery of schemes to enable successful handover into maintenance and operation. The handover comprises the civils infrastructure and the completed scheme into operation.

Data relating to assets created, amended, refurbished or removed by the scheme shall be in accordance with the Overseeing Organisation's requirements and systems. Surveys and inspections to assess and confirm the condition of the asset shall be programmed to enable the resolution of any issues and the updating of asset data prior to handover. Records required for handover shall be created, updated and maintained as the scheme progresses in accordance with the agreed programme. The approach and strategy for handover into operation and maintenance shall be defined and agreed prior to the commencement of construction and reviewed as the scheme progresses.

LD 117 Landscape Design Version 0.1.0:

Construction, operation and maintenance of roads shall be in line with the design's landscape strategy, or landscape objectives, incorporating excellence and quality in good design, value for money, and whole-life cost throughout the design life cycle.

The guidance sets out the codes for use in masterplans to set out Environmental Functions and Landscape Elements to illustrate environmental mitigation and enhancement measures.

3.2.1 Landscape design should take account of longer-term maintenance and management, and the nature of the road corridor including operational as well as safety. Planting design shall allow for access to highway structures and features and not conflict with their operational functions. Planting design is to respect existing site conditions together with retention of existing vegetation but also its contribution to ecosystems and biodiversity net gain with no net loss. Successful planting establishment requires the appropriate management during and after the establishment period.

LD 118 Biodiversity design Revision 0:

This document sets out the requirements for further preconstruction and construction biodiversity surveys and the design of biodiversity measures on highways projects. The timing and duration of surveys shall be appropriate to the habitats and species of interest and the nature of the potential impacts.

Elements of biodiversity design are shown in the environmental masterplan, (which shall be updated to reflect the as-built Scheme, including all matters relevant to the management of the soft estate and biodiversity enhancements).

3.2.2 The design of biodiversity elements should assess operational management responsibilities and whole-life costs, and Biodiversity design elements shall include ongoing maintenance, management and safety requirements. Biodiversity elements should be reported within an environmental management plan.

3.2.3 The relevant environmental function and environmental or landscape element codes shall be used to identify environmental mitigation and enhancement measures in accordance with the requirements

3.2.4 Mitigation measures should be specific and proportionate to the nature, magnitude and duration of the impact. Only mitigation measures that are effective and proven shall be included in project design. Where innovative or unproven mitigation measures are proposed, evidence of the consideration of uncertainty in accordance with the requirements of LA 104 shall be submitted to the Overseeing Organisation.

LA 120 Environmental management plans Revision 1:

An environmental management plan (EMP) shall set out the conclusions and the actions needed to manage environmental effects identified within the environmental assessment during construction and operation of a development. The EMP should be prepared to include for the management and operation of the existing network, and to establish a mechanism to link EIA assumptions, planning conditions and obligations. In accordance with LA 104, the results of monitoring shall be used to update the EMP during the construction and handover stage.

3.3 Welsh Government documents

Welsh Government Trunk Road Maintenance Manual (WGTRMM) 2016

3.3.1 WGTRMM 2016 comprises three component parts:

Part 0 – Introduction

3.3.2 WGTRMM 2016 sets out the Welsh Government's requirements for service providers and others in defining the standards to which the motorway and trunk road network in Wales should be inspected and maintained. WGTRMM also provides guidance on how these standards may be achieved.

3.3.3 *Welsh Government has a key objective to provide safe roads and reliable journeys for the road user. Effective maintenance of the Network plays an important role in achieving that objective. Under the Highways (Miscellaneous Provisions) Act 1961, highway authorities have an obligation to maintain public highways to reasonable standards.*

Part 1 – Service Code

3.3.4 Sets out the Operational Objectives and describe:

A. What should be undertaken:

i. Performance Requirements (PRs).

ii. Inspection Requirements (IRs).

B. How these should be achieved:

iii. Maintenance Requirements (MRs)

Part 2 - Network Management Manual

3.3.5 Sets out detailed **Service Requirements (SRs)** and **Guidance Information (GI):**

a) legislation, technical standards, WG policy and operational objectives;

b) References to further information;

c) Clarification of service requirements;

d) Specific process, procedure or methodology suggested by WG to achieve Service Requirements.

3.4 WGTRMM Service Areas

3.4.1 There are 27 Service Areas within WGTRMM. These have been screened to check for the relevance to the asset. The following have been selected as being of relevance and the others discounted and will not be considered further in this IS&M. A schedule of those applicable are presented in Table 3.1.

Table 3-1 Service Areas within WGTRMM of relevance to the Scheme

Ref	Service Area	Relevance to this River Dee Bridge Environmental IS&M
1.1.7	Paved Areas	Applicable to paved areas, cycle tracks, paved pedestrian routes, access tracks for inspection and maintenance
1.1.8	Drainage	Elements of the drainage system that serve an environmental function such as ditches, swales, attenuation basins, outfalls.
1.1.18	Fences, Walls, Screens and Environmental Barriers	Boundary fences, wildlife barriers, walls, environmental barriers, and screens
1.1.19	Soft Estate and Environmental Management	The natural part of the highway estate including planted areas, water bodies, naturally occurring vegetation, hedges, woodlands and areas of land held for environmental reasons.

3.5 WGTRMM Inspections

3.3.5 WGTRMM sets out three types of inspections:

Safety Inspections

3.3.6 Safety inspections and patrols are generally intended for the live carriageway and where any defects are likely to cause danger to the public. Detailed Inspections are carried out less frequently and are designed primarily to establish programmes of routine maintenance tasks not requiring urgent attention. For areas of soft estate, detailed inspection surveys are used for determining the condition of the asset both technically and relating to its environmental function. For soft estate and environmental assets ‘General Inspection’ and ‘Detailed Survey’ are used and these are described in WGTRMM 2016 Part 2.2 and are partly extracted and summarised below and in Table 3.3.

Soft Estate - General Inspection[2]

3.3.7 The general inspection focuses on the identification of defects of both landscape and environmental elements to prioritise and inform annual works programmes. Additionally, inspection of environmental assets should be undertaken to identify any obvious causes which might be preventing them performing their designed function e.g. blocked or flooded mammal underpasses.

Soft Estate – Detailed Survey[3]

3.3.8 WGTRMM stipulates that Soft Estate Detailed Surveys should comprise 20% coverage of the network each year, ensuring that the whole of the network is surveyed every five years. However, this mainly applies to the road network and soft estate where it sits within a Route Environmental Management Plan (REMP). For the purposes of this IS&M, the River Dee Bridge Scheme will be treated as an individual asset. It is expected that Welsh Government will require the Scheme to be included within the relevant REMP once handover is completed.

3.3.9 The Detailed Survey should be undertaken by an environmental specialist and should consider if the asset is performing against its environmental function using a RAG condition rating[4], as shown in Table 3.2.

Table 3-2 Detailed Survey RAG Condition Rating

Red	Amber	Green
A condition rating of Red indicates the asset is in poor condition and is either not performing according to its function or is doing so at limited capacity. Red indicates that corrective action should be prioritised, and that early action is required.	An Amber condition indicates that the asset is in satisfactory condition and is, therefore, operational, but is not fully meeting its intended function. An Amber condition rating indicates that non-urgent corrective action is required, and either the relevant maintenance works should be undertaken, prioritised against other requirements, or further inspections are required to monitor condition.	A Green condition rating indicates that the asset is in good condition and is meeting its intended function. A Green condition rating indicates that no corrective action is required; however, the next inspection should be programmed accordingly.

3.3.10 Detailed surveys will provide asset information for the soft estate. The information will:

a. Record the elements present.

b. Determine and record the function of those elements.

[2] WGTRMM 2016 – Part 2.2 para 2.2.19.3.1
[3] WGTRMM 2016 – Part 2.2 para 2.2.19.3.2
[4] WGTRMM 2016 – Part 2.2 para 2.2.19.3.2 paras 2-4

c. Provide an assessment of the condition of the asset element in meeting its designed (or naturally developed) function. The asset information will be recorded in the EnvIS database and will inform the management objectives for soft estate.

Environmental Information System - EnvIS

3.3.11 EnvIS is a system for defining and categorising the man-made or natural assets within and surrounding the Strategic Road Network. The Environmental Masterplan prepared as part of this IS&M allocates unique EnVIS feature IDs to each element that makes up the asset. A copy of the Environmental Masterplan Plan drawing (395318-RML-ZZ-DR-L-2006 to 2009) is presented in Appendix C.

Environmental Function Codes

3.3.12 WGTRMM refers to the performance of the environmental asset being demonstrated by the achievement of the environmental function that has been attributed to the asset. New DMRB Guidance LD 117 Landscape Design (March 2020) provides updated environmental function, landscape element and environmental element codes and in the absence of any previous records, have been assigned in retrospect to the elements that make up the soft estate of the asset. A full list of the environmental function and landscape element codes is presented in Appendix C. The relevant to the components of the asset are summarised in Table 3.1.

3.3.13 The River Dee Bridge Replacement Scheme contain features that make up the asset and these fall under the various categories of Service Areas. For each Service Area, WGTRMM sets out the following: -

- Performance Requirement (PR)
- Inspection Requirement (IR)
- Maintenance Requirement (MR)

The performance, inspection and maintenance requirements for each service area are summarised in Table 3.3.

Table 3-3 Landscape and Environmental Function Codes

DMRB Codes used on the Environmental Masterplan (GRASSLAND)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
GENERAL	**WG seeks to continually improve environmental management standards through:** • Identifying and addressing risks. • Ensuring that environmental management and performance are integrated across all management activities in the operation of the network. • Improving environmental asset information and developing an environmental information database (EnvIS) • Providing systems for the management of environmental asset information that will enable efficient and appropriate operational management of the soft estate. • Producing Route Environmental Management Plans with specific management objectives for the 3,000 hectares of environmental resource and the specific environmental features we are responsible for. • Encouraging innovative management and design solutions. • Seeking cost effectiveness. • Facilitating and encouraging collaborative partnership working. • Ensuring effective environmental performance through reporting on Key Performance Indicators (KPI's) and agency Area Performance Indicators (API's).				**SOFT ESTATE**	The Guidance outlines the requirements of and support the Service Providers in meeting their legal requirements and comply with health and safety, relevant legislation, WG policy and guidance, and current good practice. **WGTRMM Ref PR 1.1.19.2** The soft estate is managed in an environmentally sensitive manner to achieve the objective/functions as set out in the appropriate Route Environmental Management Plan (REMP), in accordance with DMRB **Section 2.2.19.5 1 Performance Requirements**	**See Section 3.5 of this document** **Annual walkover inspection** **Soft Estate – Reporting:** March each year the Service Provider will provide an annual report relating to their environmental management activities as detailed in 2.2.19.5 **WGTRMM Ref IR 1.1.19.6** Assess and record condition of the soft estate and collect and record asset inventory information in accordance with Section 2.2.19.3.2 "Detailed Survey" using RAG system.	**WGTRMM 2.2.19** **Section 2.2.19.1 General (see column 2)** **Section 2.2.19.2 Description and minimum requirements for compliance: t**he natural part of the highway estate including verges, embankments, cuttings, planted areas, water bodies, hedges and woodlands. The soft estate contains, any cultural heritage assets together with hard landscaping areas, environmental fencing and environmental engineering features installed for mitigation, such as mammal passes. **Section 2.2.19.3.3 Requirements:** **Route Safety Inspection Category** • Risks associated with the known condition of the soft estate. • Risks associated with the proximity or presence of other environmental features such as adjacent SSSI. • Potential cost savings • Route Management Plan requirements **Section 2.2.19.4 Soft Estate Management Guidance** **SAFETY ELEMENT: Safety cut and vegetation clearance** Vegetation shall not restrict visibility at junctions, access points and bends. Sight lines and minimum stopping distances must be kept clear. One or two cuts a year in the form of a swathe cut to maintain vegetation to a height not exceeding 300mm, should normally be sufficient to maintain verges for safety but amenity and nature conservation requirements must be considered and the regime adapted accordingly.
Grassland	LE 1.1	Amenity grassland	EFB	***Landscape integration:*** Integrate the strategic road with the character of the surrounding landscape by maintaining the matrix of local vegetation patterns, blending with local landform and softening views of the strategic road, its infrastructure and its traffic.	**1.1.19 Soft Estate and environmental Management**		**Annual walkover inspection**	**Landscape Management Handbook: Section 5.2** A single width swathe cut shall be made on verges or central reservations adjacent to the carriageway once in a growing season where: • the type and density of growth is such that pedestrians and inspection/survey parties would be at risk; • the adjacent traffic lane is less than 3.0 m, or where growth, if not cut, would reduce the effective lane width to less than this. • Where there is vigorous growth 2 cuts may be required. One cut per year between September and early October. Up to 4 cut may be needed in urban areas.

DMRB Codes used on the Environmental Masterplan (GRASSLAND)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
	LE 1.2	Grassland with bulbs	EFE	*Visual amenity* (seasonal interest) Maintain interest, variety and an acceptable visual appearance for both road users and adjacent public viewers by creating / maintaining views to the wider landscape, providing seasonal variation and creating a 'sense of place'		Grassland shall be maintained to ensure effective local environment for bulbs to prosper	**Annual walkover inspection**	**Landscape Management Handbook: Section 5.2** Grass cutting regimes must consider the flowering times and the need for plants to build food reserves and should not be done straight after flowering.
	LE 1.3	Species rich grassland	EFD	*Nature Conservation and biodiversity* Protect, manage and enhance the nature conservation value of the highway estate and integrate with and protect adjacent habitats and locations containing protected species, or other locally important species or habitats. **(Dark corridor for foraging bats)**		Areas of wildflower grassland shall be managed to maintain floristic diversity appropriate to the soil type, aspect and the desirable species range and abundance.	**Annual walkover inspection**	**DMRB Volume 10 Section 4 Part 1 -The Wildflower Handbook.** Grassed areas where wildflower sowing or planting has been undertaken require cutting accompanied by the removal of all arisings either at the time of cutting or within 72 hours. Cutting annually between September and October.
				(Area allowed to colonise with marine grassland species)			**Annual walkover inspection**	Cut only if necessary to control woody growth.
				(Area seeded with marine grassland species)			**Annual walkover inspection**	Cut only if necessary to control woody growth.
				(Intertidal zone allowed to colonise naturally)			**Annual walkover inspection**	No cutting required
			EFE	*Visual amenity* (Spring and summer interest) Maintain interest, variety and an acceptable visual appearance for both road users and adjacent public viewers by creating / maintaining views to the wider landscape, providing seasonal variation and creating a 'sense of place' via landmark features, either plant species, landform / geology.			**Annual walkover inspection**	**DMRB Volume 10 Section 4 Part 1 -The Wildflower Handbook.** Grassed areas where wildflower sowing or planting has been undertaken require cutting accompanied by the removal of all arisings either at the time of cutting or within 72 hours. Cutting annually between September and October.

DMRB Codes used on the Environmental Masterplan (GRASSLAND)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
	LE 1.4	Rock and scree	EFD	*Nature Conservation and biodiversity* **(Intertidal zone, allow to colonise naturally)** Protect, manage and enhance the nature conservation value of the highway estate and integrate with and protect adjacent habitats and locations containing protected species, or other locally important species or habitats.				The area is composed predominantly of intertidal mud and sand. There is no specific need for maintenance. Operations to be determined by the SP based on site specific survey information.
	LE 1.6	Open Grassland	EFE	*Visual amenity* Maintain interest, variety and an acceptable visual appearance for both road users and adjacent public viewers by creating / maintaining views to the wider landscape, providing seasonal variation and creating a 'sense of place' via landmark features, either plant species, landform / geology.		Retain open grassland landscape in accordance with the Landscape Element where identified or in keeping with the local landscape character.	**Annual walkover inspection**	Methods and frequency of cutting will depend upon landscape objectives. On verges to paths and minor roads: A swathe cut shall be made once in a growing season where the type and density of growth, if not cut, would reduce the effective lane width. Where there is vigorous growth, 2 cuts may be required. Timing of one cut to be between September and early October unless otherwise agreed with WG. Cuttings shall be evenly distributed. A second cut, if required in June or July.

DMRB Codes used on the Environmental Masterplan (NATIVE PLANTING)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Established trees	LE2.7	Scattered individual trees	EFB	*Landscape integration* **(Retained to enhance the new scheme)** Integrate the strategic road with the character of the surrounding landscape by maintaining the matrix of local vegetation patterns, blending with local landform and softening views of the strategic road, its infrastructure and its traffic.	**1.1.19 Soft Estate and environmental Management**	**WGTRMM Ref PR 1.1.19.2** & **Section 2.2.19.5 1 Performance Requirements**	**Annual Walkover Inspection of all trees in the soft estate.** **Detailed Inspection every 5 years by arborist.** Trees not in WG ownership that become a hazard: SP to order the owner to carry out such work as required to remedy hazard.	**Landscape Management Handbook Chapter 6 Sections 6.3 to 6.13** **Section 2.2.19.3.4 Hazardous Tree Surveys: a**ll trees within the soft estate and third party trees within falling distance of the carriageway will be surveyed every 5 years to assess and record their condition by qualified and experienced tree inspectors or arboriculturists. Defects and hazards will be assessed against the risks they represent and prioritised for remedial action in accordance with the appropriate defect category. Tree survey records will be maintained and updated in the IRIS and be made available to WG for audit and inspection on request.
Established plantations	LE2.4	Linear belts of shrubs and trees	EFB	*Landscape integration* **(Retained to enhance the new scheme)** *Integrate the strategic road with the character of the surrounding landscape by maintaining the matrix of local vegetation patterns, blending with local landform and softening views of the strategic road, its infrastructure and its traffic.*				
			EFD	*Nature conservation and biodiversity* **(Installation of bat boxes)** Protect, manage and enhance the nature conservation value of the highway estate and integrate with and protect adjacent habitats and locations containing protected species, or other locally important species or habitats.				

DMRB Codes used on the Environmental Masterplan (NATIVE PLANTING)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Native Planting	LE 2.4	Linear belts of trees and shrubs	EFA	*Visual screening*	**1.1.19 Soft Estate and environmental Management**	The SP shall inspect trees as part of their Safety Inspections and Safety Patrols; any defects identified will be categorised and actioned in accordance with the MSR for managing defects. The SP shall check whether there is a biodiversity or landscape/cultural interest, or TPO involved. Vegetation shall not restrict visibility at junctions, access points and bends. Sight lines and minimum stopping distances must be kept clear and signs, lights, safety cameras and marker posts must not be obstructed.	**Annual Walkover Inspection of all trees in the soft estate.** **Detailed Inspection every 5 years by arborist.**	**Landscape Management Handbook Chapter 6 Sections 6.3 to 6.13** Hedges and trees overhanging carriageways shall be trimmed to provide a minimum of 5.2m headroom above carriageway and 2.5m above a footpath. Trees and hedges should be pruned to maintain the overall natural form of the plants, as commensurate with their function (e.g. screening, landscape integration). Cutting or clearance should be undertaken only as needed within sight lines determined in accordance with the latest standards and advice issued by WG. The normal criterion will be to maintain desirable minimum stopping sight distance, but in some potentially dangerous locations full overtaking sight distance shall be maintained.
			EFB	*Landscape integration* (Provide dark corridor for bats)				
	LE 2.5	Shrubs with intermittent trees	EFA	*Visual screening* (Planting on embankment)				Operations and locations to be determined by the SP based on site specific survey information
			EFB	*Landscape integration* (To reinforce existing plantation edge)				
				(Provide connectivity habitat)				
				Business Park boundary planting				
	LE 2.6	Shrubs	EFA	*Visual screening* (Screen views of noise barrier)				
			EFB	*Landscape integration* (Soften appearance of bridge abutments)				
				(Continuity of planting under overhead lines)				
			EFD	*Nature Conservation and biodiversity* (Habitat and cover from native species)				
	LE 2.7	Scattered Trees	EFB	*Landscape integration* (Trees as shelter for bat roosts)		Trees shall be maintained to ensure the safety of the network, while retaining adequate foliage as cover for bats		
				(Soften appearance of bridge)		Trees shall be maintained to ensure the safety of the network,		
				(Integrate plantation with trees)				
				(Retain open aspect for shared use path)				
			EFD	*Nature Conservation and Biodiversity* (Part of hop-over for foraging bats)		Trees shall be maintained to ensure the safety of the network, while retaining adequate foliage as cover for bats		

DMRB Codes used on Environmental Masterplan (Ornamental Planting)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Ornamental planting	LE 3.2	Ornamental Shrubs	EFA	*Visual screening* (Garden boundary)	**1.1.19 Soft Estate and environmental Management**	Ornamental planting shall be maintained to ensure growth rates and form typical to the species, be free from weed species and shall not encroach upon or overhang footpaths, bridleways, cycleways or carriageways. Maintenance operation shall ensure the aesthetic appearance of planting	**Annual Walkover Inspection of all trees in the soft estate.** **Detailed Inspection every 5 years.** An annual General Inspection shall be undertaken for trees within the Soft Estate and those within falling distance of the highway as part of their annual inspection. Condition information of large trees and trees in danger to the highway shall retained in a database available for inspection by WG. The inspector shall identify potentially hazardous trees and those requiring detailed inspection and other relevant action. The SP shall inspect trees as part of their Safety Inspections and Safety Patrols; any defects identified will be categorised and actioned in accordance with the MSR for managing defects. The SP shall check whether there is a biodiversity or landscape/cultural interest, or TPO involved.	Operations and locations to be determined by the SP based on site specific survey information. Inspections should identify problem weeds and ensure that all woody weed species (i.e. species not included in the original design) are removed without potential for regrowth from the roots.
	LE 3.3	Groundcover	EFC	*Enhancing the built environment* (separating shared use path from carriageway)		Road verges and central reservations shall be maintained to ensure that pedestrians and inspections/survey parties are not at risk.		As appropriate to the size, function and species of planting. Arisings should be removed from urban locations unless otherwise agreed with WG. Inspections should identify problem weeds and ensure that all woody weed species (i.e. species not included in the original design) are removed without potential for regrowth from the roots.

DMRB Codes used on Environmental Masterplan (Hedges & Specimen trees)					**WGTRMM Requirements**			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Hedges	LE 4.1	Ornamental species hedge	EFA	*Visual Screen*	**1.1.19 Soft Estate and environmental Management**	Ensure visibility at junctions, bends and accesses and of signs, street furniture etc.	Tree and hedges: Annual inspection of trees within the soft estate and within falling distance of the highway. Identify potentially hazardous trees and record on inventory. Detailed Inspection every 5 years for stability, growth, soundness, pests and diseases	Cutting or clearance shall be carried out only as needed and at a time which gives maximum effect and avoids permanent damage to the hedge or tree. Laying of specific hedges shall be carried out at intervals of 7 years or as agreed with WG. Unlaid hedges shall be trimmed every 2-3 years subject to local conditions. Trimming should be undertaken during January – February unless subject to overriding reasons including safety. If for any reason cutting must be undertaken during the nesting season approval must be first obtained from WG and appropriate surveys undertaken. Operations and locations to be determined by the SP based on site specific survey information.
			EFC	*Enhancing the built environment* (screening of security fence)		Where appropriate hedges shall be laid for stock proofing. Unlaid hedges to be maintained to encourage new growth and bushy habit.		
	LE 4.2	Native Species Hedge	EFD	*Nature Conservation and Biodiversity* (part of the dark corridor for bats)				
	LE 4.4	Native Hedgerow with trees		*Nature Conservation and Biodiversity* (buffer for dark corridor for bats)				
Specimen trees	LE 5.1	Individual trees				Trees maintained to ensure the safety of the network.		Operations and locations to be determined by the SP based on site specific survey information.

DMRB Codes used on the Environmental Masterplan (Wetland habitat)					WGTRMM Requirements			
Soft Estate Element	**Landscape Element Codes**		**Environmental Function Code and description**		**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Wetland habitats	LE 6.1	Waterbodies and associated plants	EFH	*Water quality* (Queensferry Drain open channel)	**1.1.19 Soft Estate and environmental Management**	Areas of wetland shall be maintained to retain and develop habitats and species of ecological value or importance where this does not conflict with the requirements of the area to act as a flood relief storage area, balancing pond or other engineering function allied to the safety of the network. Maintenance which is likely to damage, disturb or kill protected habitats and species shall be carried out after consultation with NRW and if necessary, the granting of the relevant licence.		Operations and locations to be determined by the SP based on site specific survey information
	LE 6.2	Banks and ditches	EFH	(SUDS Swale reprofiled and original soils reinstated)	**1.1.19 Soft Estate and environmental Management**	**WGTRMM Ref PR 1.1.8.2** Drainage flow, treatment and balancing systems and spillage control devices function correctly.	Detailed Inspection - Interval 6 months	**Section 2.2.8.10 Vegetated drainage systems for highway runoff** **WGTRMM Ref: IR 1.1.8.12** **Landscape Management Handbook: Section 5.2** A single width swathe cut shall be made on verges or central reservations adjacent to the carriageway once in a growing season where: • the type and density of growth is such that pedestrians and inspection/survey parties would be at risk; • the adjacent traffic lane is less than 3.0 m, or where growth, if not cut, would reduce the effective lane width to less than this. • Where there is vigorous growth 2 cuts may be required. One cut per year between September and early October.
				(Banks of open channel managed to prevent woody growth)		Banks and ditches shall be maintained to ensure their structural integrity and biodiversity		**WGTRMM Ref: IR 1.1.8.12** Vegetative Treatment Systems, sluices and tidal flaps **WGTRMM Ref: MR 1.1.8.16** Cleaning out of ditches normally requires a machine excavator. S P should be aware of the potential nature conservation interest of ditches, particularly close to protected sites, natural watercourses, wetland areas and balancing ponds/flood alleviation areas. Such areas may be used by otters and other protected species. **Before ditch clearance is undertaken advice must be sought from the Service Provider's Environmental Co-ordinator or an ecologist.** Ash and other woody and non woody invasive and/or non-native invasive species shall be removed from ditches
				(Banks and grassland to be tolerant of inundation as part of SUDS measures)				

DMRB Codes used on the Environmental Masterplan					WGTRMM Requirements			
Soft Estate Element		**Environmental Element Codes**		**Environmental Function Code and description**	**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Paved surfaces	LE 7	Access tracks	EFC	*Enhancing the built environment* (Maintenance access tracks)	**1.1.7** **Paved Areas**	**WGTRMM Ref PR 1.1.7.10** Footways and cycle tracks are clear of debris and spillages which could give rise to slippery conditions	**WGTRMM Ref IR 1.1.7.16** Assess and record the condition of rural paved footways and cycle tracks. Detailed Inspection - Interval 24 months	**WGTRMM Part 2.2** Section 2.2.7.6 Footways, Cycle Tracks and Bridleways
		Public rights of Way		(Maintaining clear route by cutting vegetation)				
		Cycleway/shared use path		(Maintaining the surface and cutting obstructing vegetation)				

Table 3-4 Environmental Element and Function Codes

DMRB Codes used on the Environmental Masterplan					WGTRMM Requirements			
Soft Estate Element		**Environmental Element Codes**		**Environmental Function Code and description**	**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
Environmental barriers	E 1.2	Noise barrier (built element)			**1.1.18 Fences, walls, Screens and Environmental Barriers**	**WGTRMM Ref PR 1.1.18.1** Fences, walls, netting, screens and environmental barriers, inclusive of stock proofing, are maintained. Where vegetation hinders the performance of a noise barrier it shall be removed. However, visual screening of the barrier may be a consideration to maintenance	**WGTRMM Ref: IR 1.1.18.3** Assess and record condition and purpose of fences, walls screens and environmental barriers for Integrity, Structural Condition and Purpose. Operations and locations to be determined by the SP based on site specific survey information and shall be specific to meet the noise attenuation requirements of the location and commitments made by the WG in Environmental Statements or as part of statutory processes. Detailed Inspection - Interval 24 months	**WGTRMM 2.2.18** **Section 2.2.8.1 General** The WG operational objective for fences, walls, screens and environmental barriers (including noise) is that they should serve the purpose for which they were intended. When sections of fencing have to be replaced then the purpose for which they were originally intended should be reviewed and the appropriate type of barrier installed. **Section 2.2.18.2 Management Guidance** **Table 2.2.19.5.2 Auditory amenity:** providing and maintaining measures to reduce noise pollution. **Section 2.2.19 Noise 9E1) Page 119**
Water	E 2.1	Water pollution control	EFH	*Water quality*	**1.1.8** Drainage	**WGTRMM Ref PR 1.1.8.2** Drainage flow, treatment and balancing systems and spillage control devices function correctly.	**WGTRMM Ref: IR 1.1.8.9** Balancing ponds, retention tanks Detailed Inspection - Interval 12 months **WGTRMM Ref: IR 1.1.8.10** Culverts, headwalls and tidal flaps, aprons, pump wet wells. Detailed Inspection - Interval 24 months. **WGTRMM Ref: IR 1.1.8.12** Vegetative Treatment Systems, sluices and tidal flaps Detailed Inspection - Interval 6 months **WGTRMM Ref: MR 1.1.8.16** Cleaning out of ditches normally requires a machine excavator. Service Providers should be aware of the potential nature conservation interest of ditches, particularly close to protected sites, natural watercourses, wetland areas and balancing ponds/flood alleviation areas. Such areas may be used by otters and other protected species. **Before ditch clearance is undertaken advice must be sought from the Service Provider's Environmental Co-ordinator or an ecologist.**	**WGTRMM Ref: 2.2.8** **Section 2.2.8.1 General** The Service Provider shall consider the likely presence of protected species in all drainage features. Appropriate advice must be sought from an ecologist or WG's Environmental Advisor, before commencing work. **Section 2.2.8.2 Management Guidance** **Section 2.2.8.10 Vegetated drainage systems for highway runoff** **Section 2.2.8.11 Ancillary Items** **Section 2.2.8.14 Grassed Surface Water Channels** **Section 2.2.8.15 Flooding** **Water (E2) Page 120**
	E 2.2	Surface water outfall						
	E2.3	Soakaway / Swale						
Biodiversity / protected species measures	E 3.1	Pole mounted bat box	EFD	*Nature Conservation and biodiversity*	**1.1.19 Soft Estate and**	All maintenance operations shall be appropriate for the protected species	External inspection at least annually for presence and condition.	Operations and locations to be determined by the SP based on site specific survey information and in accordance with specific monitoring requirements set out in
		Bat roost building						

DMRB Codes used on the Environmental Masterplan					WGTRMM Requirements			
Soft Estate Element		**Environmental Element Codes**		**Environmental Function Code and description**	**Service Area**	**Performance (PR)**	**Inspection (IR)**	**Maintenance (MR)**
		Tree mounted bat box			**environmental Management**	known within the location and fully in accordance with any current and relevant protected species licence. All ecological protection measures shall be monitored and maintained to ensure good working order.	Monitor and the frequency set out in specific monitoring and maintenance commitments made in the original or current protected species licence. Record condition and maintenance undertaken in reports	protected species licences and management plans.
Ecological protection measures	3.2.1	Underpasses and crossings					Annual inspection of condition and effectiveness. Check for evidence of flooding. Check for condition and effectiveness of grills and other barriers, if present.	Operations and locations to be determined by the SP based on site specific survey information and in accordance with specific monitoring requirements set out in protected species licences and management plans. If vegetation is seen to be covering the entrance this should be reported but not removed unless instructed by the Environmental Coordinator.
	3.2.2	Mammal fence			**1.1.18 Fences, walls, Screens and Environmental Barriers**		Annual inspection of condition and effectiveness. Reactive inspection if road casualties of relevant species are reported. Report action required immediately. Record condition and maintenance undertaken in reports	Operations and locations to be determined by the SP based on site specific survey information and in accordance with specific monitoring requirements set out in protected species licences and management plans.
Invasive species	E4.2	Legislated pests		WG has a proactive approach to the control of Invasive Non-Native Species (INNS) in particular Japanese Knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), Giant Hogweed (*Heracleum mantegazzianum*). The SP has a responsibility to control and respond to complaints with regard to injurious weeds on the soft estate e.g. species covered in the Weeds Act.		A balanced approach shall be taken for the control of injurious weeds Pests shall be controlled as necessary using chemical or mechanical methods as appropriate to the location	**Landscape Management Handbook.**	Operations and locations to be determined by the SP based on site specific survey information