GALWAY TO ATHLONE CYCLEWAY

Option Selection Report

Volume F – Environmental Appendices
Appendix F1 - Biodiversity

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to biodiversity (including terrestrial and aquatic) for 5 no. route corridor options for the Galway to Athlone Cycleway Scheme. This assessment will form part of a Phase 2 – Option Selection Report. See Volume A, Option Selection Report for a description of the project. All drawings are contained in Volume D, Stage 2 Route Corridor Options. This includes for the European and National Designated sites, Ecological Receptors and Corine Data along each route.

This assessment examines each option in terms of their importance and the possible impacts resulting from the construction of a finally preferred option. The options will be compared, and impacts assessed from a biodiversity perspective. It should be noted that the optimum option from a biodiversity perspective may not be the overall optimum option when other environmental, economic, and engineering impacts are considered.

1.1 Methodology

The methodology comprised a detailed desk study assessment and consultation with key stakeholders (including the NPWS, IFI, Birdwatch Ireland etc.) These elements are used to identify, describe and map areas of known or potential ecological value. The material sources consulted as part of the desk study are as follows:

- A review of the National Parks & Wildlife Service (NPWS) natural heritage database and site specific conservation objectives for designated areas of ecological interest and sites of nature conservation importance within and adjacent to the study area (https://www.npws.ie/protected-sites);
- A review of the NPWS rare and threatened species database for records of species of conservation interest within the study area;
- Literature review to identify and collate relevant published information on both ecological aspects of the study area and relevant ecological studies conducted in other areas, including the following:
  - New Atlas of the British and Irish Flora (CD-ROM);
  - The National Biodiversity Data Centre (NBDC) database (http://maps.biodiversityireland.ie), consulted for records of rare, protected and invasive species for Irish National Grid 10km square, accessed online July 2020;
  - Boundaries for catchments with confirmed or potential Freshwater Pearl Mussel (FWPM) *Margaritifera* populations in GIS format available online from the NPWS;
  - Bat Conservation Ireland's website (http://www.batconservationireland.org);
  - Irish Butterflies website (http://www.irishbutterflies.com);
  - Water Framework Directive website (www.wfdireland.ie);
  - 'The Angler's Guide to Game Fishing in the Western Region' Western Regional Fisheries Board, 2003;
  - Botanical Society of Britain & Ireland Distribution Database accessed online May 2020 (https://database.bsbi.org/);
  - GeoHive online mapping (http://map.geohive.ie/mapviewer.html);
  - Department of Housing, Planning, Community and Local Government – online land-use mapping www.myplan.ie/en/index.html;
  - Environmental Protection Agency (EPA) online interactive mapping tools (https://gis.epa.ie/EPAMaps) and (https://www.catchments.ie/maps/) for water quality data including surface and ground water quality status, and river catchment boundaries;
  - Information on ranges of mobile Qualifying Interest (QI) populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2019a), and associated digital shapefiles obtained from the NPWS Research Branch;
  - Environmental Protection Agency – water bodies and water quality (www.epa.ie);
  - Environmental Protection Agency Catchments resource (https://www.catchments.ie/maps/);
  - Geological Survey of Ireland – geology, soils and hydrogeology (www.gsi.ie);
  - WFD website (www.wfdireland.ie);

- Inland Fisheries Ireland (www.fisheriesireland.ie)and (http://wfdfish.ie/);
- BirdWatch Ireland (https://birdwatchireland.ie/);
- Colhoun K. & Cummins, S. 2013 Birds of Conservation Concern in Ireland 2014-19. Irish Birds 9:523-544;
- Any local surveys of flora, fauna and habitat available using the Heritage Councils mapping website (https://heritagemaps.ie/WebApps/HeritageMaps/index.html);
- River Basin Management Plan 2018 – 2021: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf; and
- Review of Ordnance Survey maps and of orthophotography.

A review of orthophotography resources of the study area was also carried out. The objective of this review was to identify areas of low ecological value, such as urban areas and areas under arable cultivation or under intensive pasture. Conversely, the review of aerial photographs was also used to identify areas of potentially high ecological value such as woodlands and wetlands.

1.1.1 Legislation

The methodology followed in relation to this assessment has had regard to the following legislation:

- EIA Directive 2011/92/EU as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment;
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive (79/409/EEC) on the conservation of wild birds (Birds Directive);
- EU Water Framework Directive (2000/60/EC);
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 84 of 1988);
- Planning and Development Act, 2000 (as amended) (PDA);
- Planning and Development Regulations, 2001 (as amended)(P&D Regs);
- European Communities (Environmental Liability) Regulations, 2008 (S.I. No. 547 of 2008);
- European Communities (Birds and Natural Habitats) Regulations 2011 as amended;
- Flora Protection Order, 2015;
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018);
- Wildlife Acts 1976 to 2018; and
- Recent Irish and European case law on the Habitats Directive.

2 EXISTING ENVIRONMENT

2.1.1 Designated Sites of Conservation Importance

The site synopses produced by NPWS are a source of information used when investigating important habitats or species likely to be found within areas that have been officially designated because of their conservation importance.

The main types of designation are:

- Special Area of Conservation (SAC);
- Special Protection Area (SPA);
- Natural Heritage Area (NHA); and
- Proposed Natural Heritage Area (pNHA).

In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for conservation under the Habitats Directive 92/43/EEC and include habitats listed on Annex I (including priority types which are in danger of disappearance) and Annex II listed species. SPAs are selected for the conservation under the EU Birds Directive 2009/147/EC protecting birds listed on Annex I and other regularly occurring migratory birds and their habitats. The EU Habitats Directive and EU Birds Directive are both transposed into Irish Law through the European Communities (Birds and Natural Habitats) Regulations 2011 (Statutory Instrument No. 477/2011 (2011, as amended).

A total of 66 European Sites (50 SAC's and 16 SPA's) are within or adjacent to the study area. Each European designated site is listed in **Table 2-1** with their qualifying interests and potential effect.

It should be noted that potential direct or indirect effects on groundwater dependant terrestrial ecosystems (GWDTE) such as turloughs, raised bogs, fens etc have been noted in the **Table 2-1**. These potential impacts are unlikely due to the nature of construction of cycleways which rarely require significant cuts or interaction with groundwater. Mitigation measures or local re-routing or micro-siting can be detailed at design stage in specific areas where required.

SACs and SPAs are a particular constraint to the proposed project as under Article 6(2) of the Habitat Directive and Article 4(4) of the Birds Directive, Member States are required to take appropriate steps to avoid the deterioration of habitats or disturbance of the species, in so far as such disturbance could be significant in relation to the objectives of this Directive. Therefore, the proposed project must ensure that it will not adversely affect the integrity of European sites.

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) comprise nationally protected sites. NHAs are protected under the Wildlife Amendment Act 2000 (as amended), many of which overlap with European Sites. The pNHAs were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated, however they do have some protection under schemes such as Rural Environment Protection Scheme (REPS), Agri-Environmental Options Scheme (AEOS) and County Development Plans and Licensing Authorities.

A total of 63 NHA/pNHA sites lie within or adjacent to the study area. Each designated site is listed in **Table 2-2** and details of which site is crossed by the potential routes study areas.

There are 5 Nature Reserves within the study area including Rosturra Wood (S.I. No. 375/1983), Derrycrag Wood (S.I. No. 376/1983), Pollnaknockaun Wood (S.I. No. 377/1983), Coole Garryland (S.I. No. 379/1983) and Ballynastaig Wood (S.I. No. 378/1983). The Ramsar sites located within the study area include Lough Corrib (Ramsar ID 846), Inner Galway Bay (Ramsar ID 838), Coole Lough & Garryland Wood (Ramsar ID 473) and Mongan Bog (Ramsar ID 473).

Table 2-1: European Designated Sites within Study Area

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
SAC	Ardgraigue Bog SAC	2356	4 & 5 (West Meelick, Killimor)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Over 6km from SAC and no direct hydrological impact; limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Ardrahan Grassland SAC	2244	5 (near Ballinderreen)	Alpine and Boreal heaths [4060] Juniperus communis formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Limestone pavements [8240]	5.5km to SAC and no direct hydrological impact; limited for potential indirect impacts.	Least concern
SAC	Ballinduff Turlough SAC	2295	5 (North Gort)	Turloughs [3180]	Nearly 3km to route which is existing track. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate / least concern
SAC	Ballynamona Bog and Corkip Lough SAC	2339	4 & 5 (West Athlone)	Turloughs [3180] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Bog woodland [91D0]	Over 7km to SAC and no direct hydrological impact; slight to limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Barroughter Bog SAC	231	4 & 5 (West Portumna)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Route through bog but on existing tracks. Potential for direct hydrological and hydrogeological impact.	Most concern
SAC	Caherglassaun Turlough SAC	238	5 (northwest Gort)	Turloughs [3180] Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270]	Route through turlough on existing track with 225m along hedgerow on new track. Potential for direct	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	hydrological and hydrogeological impact. Also potential impact for disturbance on bat roosts.	
SAC	Cahermore Turlough SAC	2294	5 (northwest Gort)	Turloughs [3180	Over 1km to SAC and on existing tracks. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Carrowbaun, Newhall and Ballylee Turloughs SAC	2293	5 (Northeast Gort)	Turloughs [3180]	Nearly 3km to SAC and on existing tracks. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Carrownagappul Bog SAC	1242	1 (North Mountbellew)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Nearly 2km to SAC. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Castlesampson Esker SAC	1625	4 & 5 (West Athlone)	Turloughs [3180] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	1.5km to Rail route. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime. Over 6km to SAC and no direct hydrological impact; Limited potential for indirect impacts to hydrogeological regime.	Intermediate concern Least concern
SAC	Castletaylor Complex SAC	242	5 (north Ardrahan)	Turloughs [3180] Alpine and Boreal heaths [4060] Juniperus communis formations on heaths or calcareous grasslands [5130]	4.5km to SAC. Slight to limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Limestone pavements [8240]		
SAC	Cloonmoylan Bog SAC	248	4 & 5 (West Portumna)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Bog woodland [91D0]	Directly adjacent to boundary of SAC. Potential for direct impacts to hydrological and hydrogeological regime.	Most concern
SAC	Coole-Garryland Complex SAC	252	5 (Gort)	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] Turloughs [3180] Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270] Juniperus communis formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Limestone pavements [8240] Taxus baccata woods of the British Isles [91J0]	Route through SAC on existing tracks. Potential for direct impacts to hydrological and hydrogeological regime.	Most concern
SAC	Crosswood Bog SAC	2337	All (East Athlone)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]	3.5km to SAC. Route on opposite side of River Shannon from SAC. Limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Curraghlehanagh Bog SAC	2350	1 (North Mountbellew)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Over 5km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
SAC	Derrinlough (Cloonkeenleananode) Bog SAC	2197	1 (North west Moylough)	Degraded raised bogs still capable of natural regeneration [7120]	Over 7km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Derrycrag Wood Nature Reserve SAC	261	4 & 5 (East Woodford)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Route through SAC on existing track. Potential for direct impacts to hydrological regime.	Most concern
SAC	Drummin Wood SAC	2181	5 (East Gort)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Over 1.5km to SAC and limited potential for direct impacts to hydrological regime.	Intermediate / least concern
SAC	East Burren Complex SAC	1926	5 (Northwest of Gort)	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] Turloughs [3180] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Alpine and Boreal heaths [4060] Juniperus communis formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Petrifying springs with tufa formation (Cratoneurion) [7220] Alkaline fens [7230] Limestone pavements [8240]	Route adjacent to SAC boundary on existing track. Potential for direct impacts to hydrological and hydrogeological regime. Also potential impact for disturbance on bat roosts.	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Caves not open to the public [8310] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Euphydryas aurinia (Marsh Fritillary) [1065] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303] Lutra lutra (Otter) [1355]		
SAC	Fin Lough (Offaly) SAC	576	4 & 5 (Clonmacnoise)	Alkaline fens [7230] Vertigo geyeri (Geyer's Whorl Snail) [1013]	2.5km to SAC. Route on opposite side of River Shannon from SAC. Limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Four Roads Turlough SAC	1637	1 (North of Ballyforan)	Turloughs [3180]	Over 5km from route and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Galway Bay Complex SAC	268	All	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Turloughs [3180]	Route 5 along coast shares boundary of SAC at Kinvara (along coast road at Dunguaire Castle, the road to Moran's of the Weir, sea road at Clarinbridge, Middle Third and Rinville). Route study area near SAC boundary along existing track north of Kinvara and west of Ballinderreen. All routes will merge on coast road from Oranmore to Ballyloughane along SAC boundary.	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Juniperus communis formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Alkaline fens [7230] Limestone pavements [8240] Lutra lutra (Otter) [1355] Phoca vitulina (Harbour Seal) [1365]	Potential for direct impacts to hydrological and hydrogeological regime.	
SAC	Glenloughaun Esker SAC	2213	3 (South west Ballinasloe)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	3km from SAC. Hydrological connection from Melehan / Ballinure river (which is crossed by route) to SAC. Potential for direct impacts to hydrological regime.	Most concern
SAC	Gortacarnaun Wood SAC	2180	5 (South east Gort)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	3.5km from SAC. Hydrological connection from Owandalulleegh river (which is crossed by route at Derrywee river) to SAC. Potential for direct impacts to hydrological regime.	Most concern
SAC	Killeglan Grassland SAC	2214	4 & 5 & 1 (West Athlone)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	Over 3km from route 1. River Suck in between route and SAC. No direct hydrological impacts. 14.5km from routes 4 / 5. No direct hydrological impacts.	Least concern Least concern
SAC	Kiltartan Cave (Coole) SAC	286	5 (north west Gort)	Caves not open to the public [8310] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	Over 1km from cave entrance and on existing tracks. Limited potential for direct hydrological	Intermediate concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
					impacts. Potential impact for disturbance on bat roosts.	
SAC	Kiltiernan Turlough SAC	1285	5 (near Ballinderreen)	Turloughs [3180]	Over 3km to SAC and slight / limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Levally Lough SAC	295	1 (North east Abbeyknockmoy)	Turloughs [3180]	Over 12km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Lough Corrib SAC	297	1 (South east Abbeyknockmoy)	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Petrifying springs with tufa formation (Cratoneurion) [7220]	Adjacent to SAC and crosses SAC at one point over an existing bridge. Potential for direct impacts to hydrological and hydrogeological regime. Also potential impact for disturbance on bat roosts.	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Alkaline fens [7230] Limestone pavements [8240] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Bog woodland [91D0] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Salmo salar (Salmon) [1106] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303] Lutra lutra (Otter) [1355] Najas flexilis (Slender Naiad) [1833] Hamatocaulis vernicosus (Slender Green Feather-moss) [6216]		
SAC	Lough Coy SAC	2117	5 (north east Gort)	Turloughs [3180]	Over 3.5km to SAC and slight / limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Lough Croan Turlough SAC	610	4 & 5 & 1 (North west Athlone)	Turloughs [3180]	Over 14.5km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Lough Cutra SAC	299	5 (East Gort)	Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	Route less than 300m to SAC and hydrological link with Gort river and lake. Route partially on existing track. However, QI of SAC is the Lesser Horseshoe Bat. Potential for direct and indirect impacts on SAC due to vegetation	Intermediate concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
					clearance, disturbance during construction or lighting during operational phase.	
SAC	Lough Derg, North-east Shore SAC	2241	4 & 5 (West Portumna)	Juniperus communis formations on heaths or calcareous grasslands [5130] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Alkaline fens [7230] Limestone pavements [8240] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Taxus baccata woods of the British Isles [91J0]	Along boundary of SAC but on existing tracks. Potential for direct impacts to hydrological and hydrogeological regime.	Most concern
SAC	Lough Fingall Complex SAC	606	5 (Ballinderreen)	Turloughs [3180] Alpine and Boreal heaths [4060] Juniperus communis formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Limestone pavements [8240] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	Less 100m from SAC and route on main road. Potential for direct impacts to hydrological and hydrogeological regime. Also potential impact for disturbance on bat roosts and foraging grounds during operational phase.	Most concern
SAC	Lough Rea SAC	304	4 (Loughrea)	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]	Route on boundary of SAC. Potential for direct impacts to hydrological regime.	Most concern
SAC	Lough Ree SAC	440	4 & 5 (North Athlone)	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Active raised bogs [7110]	Less 1.2km from SAC and linked by River Shannon to Lough Ree. Potential for direct impacts to hydrological and hydrogeological regime.	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Degraded raised bogs still capable of natural regeneration [7120] Alkaline fens [7230] Limestone pavements [8240] Bog woodland [91D0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Lutra lutra (Otter) [1355]		
SAC	Loughatorick South Bog SAC	308	5 (South Woodford)	Blanket bogs (* if active bog) [7130]	Over 7km from SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Mongan Bog SAC	580	4 & 5 (Clonmacnoise)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	2km to SAC. Route on opposite side of River Shannon from SAC. Limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	Monivea Bog SAC	2352	1 (Monivea)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Less 150m from SAC and on existing tracks at this location through Monivea forest. Potential for direct impacts to hydrological and hydrogeological regime.	Most / Intermediate concern
SAC	Peterswell Turlough SAC	318	5 (northeast Gort)	Turloughs [3180] Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270]	Over 5km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Pilgrim's Road Esker SAC	1776	4 & 5 (Clonmacnoise)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	2km to SAC. Route on opposite side of River Shannon from SAC. Limited	Intermediate concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
					potential for indirect impacts to hydrological regime.	
SAC	Pollagoona Bog SAC	2126	5 (South Woodford)	Blanket bogs (* if active bog) [7130]	Over 3km from SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Intermediate concern
SAC	Pollnaknockaun Wood Nature Reserve SAC	319	4 & 5 (Northeast Woodford)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Route through SAC on existing tracks. Potential for direct impacts to hydrological regime.	Most concern
SAC	Rahasane Turlough SAC	322	5 (east Kilcolgan)	Turloughs [3180]	Less 4km from SAC and linked by Dunkellin River. Potential for indirect impacts to hydrological and hydrogeological regime.	Most / Intermediate concern
SAC	Redwood Bog SAC	2353	4 & 5 (South west Banagher)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Less 1.5km from SAC. Route on opposite side of River Shannon from SAC. Limited potential for indirect impacts to hydrological and hydrogeological regime.	Intermediate concern
SAC	River Shannon Callows SAC	216	4 & 5 (North Portumna)	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410], Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] Alkaline fens [7230] Limestone pavements [8240] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Lutra lutra (Otter) [1355]	Adjacent to SAC on existing walkway. Potential for direct impacts to hydrological and hydrogeological regime.	Most concern
SAC	Rosturra Wood SAC	1313	4 & 5 (East Woodford)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Route through SAC on existing track. Potential for	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
					direct impacts to hydrological regime.	
SAC	Shankill West Bog SAC	326	1 (North Moylough)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Over 5km to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Least concern
SAC	Sonnagh Bog SAC	1913	4 & 5 (East of Peterswell)	Blanket bogs (* if active bog) [7130]	Over 3.5km from Route 4 and 7km to Route 5 to SAC and no direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Intermediate concern
SAC	Termon Lough SAC	1321	5 (Southwest Gort)	Turloughs [3180]	Over 3km from route to SAC. On existing tracks. No direct impact to hydrological regime. Limited potential for indirect impacts to hydrogeological regime.	Intermediate concern
SPA	Coole-Garryland SPA	4107	5 (West Gort)	Whooper Swan (*Cygnus cygnus*) [A038]	Through SPA on existing tracks	Intermediate concern
SPA	Cregganna Marsh SPA	4142	2 and 5 (West Oranmore)	Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	200m from boundary of SPA but on existing road	Intermediate concern
SPA	Four Roads Turlough SPA	4140	1 (North Ballyforan)	Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Golden Plover (*Pluvialis apricaria*) [A140]	Over 5km from SPA on opposite side of River Suck	Least concern
SPA	Inner Galway Bay SPA	4031	All	Black-throated Diver (*Gavia arctica*) [A002] Great Northern Diver (*Gavia immer*) [A003] Cormorant (*Phalacrocorax carbo*) [A017] Grey Heron (*Ardea cinerea*) [A028] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052]	Route 5 along coast shares boundary of SPA at Kinvara (along coast road at Dunguaire Castle, the road to Moran's of the Weir, sea road at Clarinbridge, Middle Third and Rinville). Route study	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Red-breasted Merganser (*Mergus serrator*) [A069] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Sandwich Tern (*Sterna sandvicensis*) [A191] Common Tern (*Sterna hirundo*) [A193]	area near SPA boundary along existing track north of Kinvara and west of Ballinderreen. All routes will merge on coast road from Oranmore to Ballyloughane along SPA boundary.	
SPA	Lough Corrib SPA	4042	1 (South east Abbeyknockmoy)	Gadwall (Anas strepera) [A051] Shoveler (Anas clypeata) [A056] Pochard (Aythya ferina) [A059] Tufted Duck (Aythya fuligula) [A061] Common Scoter (Melanitta nigra) [A065] Hen Harrier (Circus cyaneus) [A082] Coot (Fulica atra) [A125] Golden Plover (Pluvialis apricaria) [A140] Black-headed Gull (Chroicocephalus ridibundus) [A179] Common Gull (Larus canus) [A182] Common Tern (Sterna hirundo) [A193] Arctic Tern (Sterna paradisaea) [A194] Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] Wetland and Waterbirds [A999]	Study area over 5km from SPA boundary across Galway City	Least concern
SPA	Lough Croan Turlough SPA	4139	4 & 5 & 1 (North west Athlone)	Shoveler (*Anas clypeata*) [A056] Golden Plover (*Pluvialis apricaria*) [A140] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Over 14.5km to SPA	Least concern
SPA	Lough Cutra SPA	4056	5 (South east Gort)	Cormorant (Phalacrocorax carbo) [A017	Less 300m to SPA	Most concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
SPA	Lough Derg (Shannon) SPA	4058	4 & 5 (Portumna)	Cormorant (*Phalacrocorax carbo*) [A017] Tufted Duck (*Aythya fuligula*) [A061] Goldeneye (*Bucephala clangula*) [A067] Common Tern (*Sterna hirundo*) [A193]	Along boundary of SAC but on existing tracks.	Most concern
SPA	Lough Rea SPA	4134	4 (Loughrea)	Shoveler (*Anas clypeata*) [A056] Coot (*Fulica atra*) [A125]	Route on shores of SPA on existing road	Most concern
SPA	Lough Ree SPA	4064	All (North Athlone)	Little Grebe (Tachybaptus ruficollis) [A004] Whooper Swan (Cygnus cygnus) [A038] Wigeon (Anas penelope) [A050] Teal (Anas crecca) [A052] Mallard (Anas platyrhynchos) [A053] Shoveler (Anas clypeata) [A056] Tufted Duck (Aythya fuligula) [A061] Common Scoter (Melanitta nigra) [A065] Goldeneye (Bucephala clangula) [A067] Coot (Fulica atra) [A125] Golden Plover (Pluvialis apricaria) [A140] Lapwing (Vanellus vanellus) [A142] Common Tern (Sterna hirundo) [A193]	Less 1.2km from SPA	Most / Intermediate concern
SPA	Middle Shannon Callows SPA	4096	4 & 5 (North Portumna)	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Corncrake (*Crex crex*) [A122] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Black-tailed Godwit (*Limosa limosa*) [A156] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Wetland and Waterbirds [A999]	Route through SPA on existing Hymany Way walking trail	Most concern
SPA	Mongan Bog SPA	4017	1, 3, 4 & 5 (East of Clonmacnoise)	Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]	Routes 2.5km from SPA boundary on opposite side of River Shannon	Most concern
SPA	Rahasane Turlough SPA	4089	5 (east Kilcolgan)	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Golden Plover (*Pluvialis apricaria*) [A140] Black-tailed Godwit (*Limosa limosa*) [A156]	Less 4km from SPA but no direct access	Intermediate concern

Site Type	Site Name	Site Code	Route	Protected Elements (QI) with code in []	Distance from or route through	Potential Effect (Most concern, intermediate and least concern)
				Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]		
SPA	River Little Brosna Callows SPA	4086	4 & 5 (Meelick)	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Black-tailed Godwit (*Limosa limosa*) [A156] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Route on opposite side of Shannon less than 1km away	Most concern
SPA	River Suck Callows SPA	4097	All 1 (from Shannonbridge to South Ballyforan) 2 (Ballinasloe) 3 (from Shannonbridge to Ballinasloe) 4 & 5 (Shannonbridge)	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Route 1 crosses river on existing Bord na Mona rail line near Shannonbridge and follows existing track to Ballinasloe before moving along boundary of SPA to south of Ballyforan. Route 2 crosses river on exiting crossing. Route 3 crosses river on existing Bord na Mona rail line near Shannonbridge and follows existing track to Ballinasloe. Route 4 / 5 borders SPA boundary at Shannonbridge on existing bridge crossing	Most concern
SPA	Slieve Aughty Mountains SPA	4168	4 & 5 (East of Gort)	Hen Harrier (*Circus cyaneus*) [A082] Merlin (*Falco columbarius*) [A098]	Route through SPA on mostly existing tracks of Coillte forestry lands	Most concern

Table 2-2: Designated Sites within the Study Area

Site Type	Site Name	Site Code	Crossed by Route Study Area	Crossed by Proposed Route
NHA	Annaghbeg Bog NHA	2344	1	Route across area on mostly existing tracks
NHA	Ballygar Bog NHA	229		
NHA	Ballymacegan Bog NHA	642		
NHA	Capira/Derrew Bog NHA	1240		
NHA	Carrickynaghtan Bog NHA	1623	1, 3, 4 and 5	Route across area on existing tracks
NHA	Castle Ffrench East Bog NHA	1244	1	Route on boundary of NHA on existing tracks
NHA	Castle Ffrench West Bog NHA	280		
NHA	Cloonoolish Bog NHA	249		
NHA	Cregganna Marsh NHA	253	5	Route on main road near NHA boundary
NHA	Crit Island West NHA	254	1	Route across area on mostly existing tracks. New tracks will be assessed at design stage.
NHA	Derrinlough Bog NHA	1254		
NHA	Derrynagran Bog And Esker NHA	1255		
NHA	Eskerboy Bog NHA	1264		
NHA	Killaclogher Bog NHA	1280		
NHA	Killure Bog NHA	1283	1	Route near boundary of NHA on opposite side of the Bunowen River. New track required at this location so potential for direct hydrological and hydrogeological impacts.
NHA	Kilnaborris Bog NHA	284	4 and 5	Route on boundary of NHA
NHA	Lough Tee Bog NHA	307		
NHA	Meeneen Bog NHA	310	4 and 5	Route near boundary of NHA
NHA	Moorfield Bog NHA	1303		
NHA	Raford River Bog NHA	321	3	Route on boundary of NHA
NHA	River Little Brosna Callows NHA	564		
NHA	Slieve Aughty Bog NHA	1229	4 and 5	Route on boundary of NHA
NHA	Suck River Callows NHA	222	All	Route 1 crosses river on existing Bord na Mona rail line near Shannonbridge and follows existing track to Ballinasloe before moving along boundary of NHA to south of Ballyforan. Route 2 crosses river on exiting crossing.

Site Type	Site Name	Site Code	Crossed by Route Study Area	Crossed by Proposed Route
				Route 3 crosses river on existing Bord na Mona rail line near Shannonbridge and follows existing track to Ballinasloe. Route 4 / 5 borders NHA boundary at Shannonbridge on existing main road bridge crossing
pNHA	Ardgraigue Bog	1224		
pNHA	Ballinasloe Esker	1779	1, 2 and 3	Route across area on existing tracks
pNHA	Barroughter Bog	231	4 and 5	Route across area on existing tracks
pNHA	Caherglassaun Turlough	238	5	Route through turlough on existing track with 225m along hedgerow on new track.
pNHA	Callow Lough	1239		
pNHA	Carrownagappul Bog	1242		
pNHA	Castlesampson Esker	1625		
pNHA	Castletaylor Complex	242		
pNHA	Clonfert Cathedral	244	4 and 5	Route near boundary of pNHA
pNHA	Cloonascragh Fen And Black Wood	1247		
pNHA	Cloonmoylan Bog	248	4 and 5	Route on boundary of pNHA
pNHA	Coole-Garryland Complex	252	5	Route across area on existing tracks
pNHA	Cranberry Lough	1630		
pNHA	Curraghlehanagh Bog	256		
pNHA	Feacle Turlough	1634		
pNHA	Galway Bay Complex	268	All	Route 5 along coast shares boundary of pNHA at Kinvara (along coast road at Dunguaire Castle, the road to Moran's of the Weir, sea road at Clarinbridge, Middle Third and Rinville). Route study area near pNHA boundary along existing track north of Kinvara and west of Ballinderreen. All routes will merge east of Oranmore to the east of the Westlink Commercial Park and cross the pNHA before continuing on the coast road from Oranmore to Ballyloughane along pNHA boundary.
pNHA	Grand Canal	2104		
pNHA	Kiltartan Cave (Coole)	286	5	Over 1km from cave entrance and on existing tracks.
pNHA	Kiltiernan Turlough	1285		

Site Type	Site Name	Site Code	Crossed by Route Study Area	Crossed by Proposed Route
pNHA	Kiltullagh Turlough	287		
pNHA	Knockavanny Turlough	289		
pNHA	Levally Lough	295		
pNHA	Lough Croan Turlough	610		
pNHA	Lough Derg	11	4 and 5	Route on boundary of pNHA on existing tracks
pNHA	Lough Fingall Complex	606	5	Less 100m from pNHA and route on main road.
pNHA	Lough Rea	304	4	Route on boundary of pNHA
pNHA	Lough Ree	440		
pNHA	Monivea Bog	311		
pNHA	Peterswell Turlough	318		
pNHA	Pollnaknockaun Wood Nature Reserve	319	4 and 5	Route across area of pNHA on existing tracks
pNHA	Rahasane Turlough	322		
pNHA	Redwood Bog	654		
pNHA	Richmond Esker Nature Reserve	323		
pNHA	River Shannon Callows	216	1, 3, 4 and 5	Route on boundary and crossing pNHA on existing walkway and track
pNHA	Rosturra Wood	1313	4 and 5	Route across area of pNHA on existing tracks
pNHA	Shankill West Bog	326		
pNHA	Sonnagh Bog	1913		
pNHA	Summerville Lough	1319		
pNHA	Tiaquin Bog	1709	1	Route across area of pNHA on mostly existing tracks. New tracks can be re-routed out of designated area.

2.1.2 Protected Flora

A search of National Biodiversity Data Centre (NBDC) online database was conducted for records of vascular plants listed in Annex II, IV and V of the EU Habitats Directive and vascular plants protected under the Flora Protection Order (FPO) within the study area. These are listed in Appendix B in Volume B – Constraints Study Report.

FPO species Narrow-leaved Helloborine (*Cephalanthera longifolia*), Meadow Barley (*Hordeum secalinum*), Irish Fleabane (*Inula salicina*), Mudwort (*Limosella aquatica*) and Wood Bitter-vetch (*Vicia orobus*) were recorded within the study area on NBDC. Fir Clubmoss (*Huperzia selago*), protected under Annex V of the EU Habitats Directive was recorded on NBDC within the study area.

Rare and protected flora are a potential constraint to the project. Potential impacts to these species where they are found within the study area through field surveys or where there is potential to support these species will be assessed in the biodiversity impact assessments for the project.

2.1.3 Habitats

Aerial photography was examined in order to identify areas of particular interest. Habitats were identified and classified according to the Guidelines set out in *'A Guide to Habitats in Ireland*' (Fossitt, 2000) which classifies habitats based on the vegetation present and management history. The classification is a standard system for identifying, describing and classifying wildlife habitats in Ireland. The habitats found with the study and their potential correspondence with Annex I habitats is also identified. The Irish Semi-natural Grassland Survey identified a number of different grassland types within the study area, these are listed in Appendix B in Volume B – Constraints Study Report.

Due to the large extent of the study area a large variety of habitats were identified within the study area. These are detailed in **Table 2-3** below.

Table 2-3: Habitat types present within the study area

Fossitt Habitat Code	Habitat Type
BL1	Stone Walls and Other Stonework
BL2	Earth Banks
BL3	Buildings and Artificial Surfaces
ED3	Recolonising Bare Ground
ED2	Spoil and bare ground
ER2	Exposed Calcareous Rock*
EU1	Cave*
FL2	Acid oligotrophic lakes
FL3	Limestone/ marl lakes*
FL4	Mesotrophic lakes
FL6	Turloughs
FS1	Reed and large sedge swamps
FS2	Tall-herb swamps*
FP1	Calcareous spring*
FW1	Eroding/upland rivers
FW2	Depositing/lowland rivers*
FW4	Drainage ditches
GA1	Improved agricultural grassland
GA2	Amenity grassland (Improved)
GM1	Marsh*
GS1	Dry Calcareous and Neutral Grassland*
GS2	Dry meadows and grassy verges*
GS4	Wet grassland*

Fossitt Habitat Code	Habitat Type
LR1	Exposed Rocky Shores
LS3	Muddy Sandy Shores*
PB2	Upland blanket bog*
PB3	Lowland blanket bog*
PB4	Cutover bog*
PF1	Rich fen and flush*
WD1	(Mixed) broadleaved woodland
WD2	Mixed broadleaved/conifer woodland
WD4	Conifer plantation
WD5	Scattered trees and parkland
WL1	Hedgerows
WL2	Treelines
WN1	Oak-birch-holly woodland*
WN5	Riparian Woodland*
WN6	Wet willow-alder-ash woodland*
WN7	Bog woodland
WS1	Scrub*
WS1	Scrub*

* denotes that the habitat has the potential for links with EU Annex I habitat types

A number of these habitats correspond with Annex I habitat types and may be found within or outside SACs within the study area.

The hydrology and geology have a significant influence on the habitats within the study area. The wetlands and floodplains of the River Shannon and River Suck support seasonally flooded grasslands called 'Callows' and wet woodlands (WN5 and WN6), with raised bogs occupying former lakes and shallow depressions in the landscape.

The geology of the area is varied with a distinctly calcareous (limestone) influence in the midlands and west of the study area with the siliceous influence of the old red sandstone of the Slieve Aughty Mountains to the south.

Limestone derived soils may support the Annex I grassland habitats semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210], lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510) and *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410].

A total of 2,129 karst features were recorded within the study area comprising enclosed depressions (including sinkholes and dolines), swallow holes, estevells, springs, dry valleys, caves and the Annex I habitats Turloughs [3180] and Limestone Pavements [8240]. The NPWS undertook a National survey of limestone pavement and associated habitats in 2013[1]. A summary of the distribution of this habitat within the study area is provided in Appendix B in Volume B – Constraints Study Report.

Karst features often provide a supporting hydrological function to Annex I Groundwater Dependent Terrestrial Ecosystems (GWDTE) including Turloughs [3180], Petrifying springs with tufa formation (Cratoneurion) [7220], Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210], Alkaline fens [7230], Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140], all of which have been recorded within the study area.

[1] Wilson, S. & Fernández, F. (2013) National survey of limestone pavement and associated habitats in Ireland. Irish Wildlife Manuals, No. 73. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

The NBDC was searched for records of ancient or long-established woodlands present within the study area. There were 97 records within the study area, provided in Appendix B in Volume B – Constraints Study Report.

The CORINE Land cover inventory is a Pan-European landcover and landuse mapping programme. It gives an overview of the landcover across Europe and can be used to assess land use change over the years. For the purpose of this constraints study three land cover types were assessed within the study area including broad-leaved forests, mixed forests and coniferous forests. There were 29 records of broad-leaved forest, 95 for coniferous forests and 34 for mixed forest within the study area (see Appendix B in Volume B – Constraints Study Report).

2.1.4 Invasive species

A search of the NBDC online database was conducted for records of invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011 (SI No. 477/2011), as amended. Under Regulation 49(2) of the 2011 Regulations, it is an offence to plant, disperse, allow or cause to disperse, spread or otherwise cause to grow in any place, any plant included in Part 1 of the Third Schedule without a licence from the Minister for Arts, Heritage and the Gaeltacht.

Invasive species recorded on NBDC within the study area are displayed in **Table 2-4** below.

Table 2-4: SI No. 477/2011 Third Schedule Invasive Species records on NBDC

Common Name	Scientific Name
American mink	*Mustela vison*
Asian river clam	*Corbicula fluminea*
Canada Goose	*Branta canadensis*
Canadian waterweed	*Elodea canadensis*
Eastern Grey Squirrel	*Sciurus carolinensis*
Fallow deer	*Dama dama*
Giant hogweed	*Heracleum mantegazzianum*
Greylag goose	*Anser anser*
Himalayan knotweed	*Persicaria wallichii*
Japanese knotweed	*Fallopia japonica*
Nuttall's waterweed	*Elodea nuttallii*
Rhododendron	*Rhododendron ponticum*
Roach	*Rutilus rutilus*
Ruddy Duck	*Oxyura jamaicensis*
Sea-buckthorn	*Hippophae rhamnoides*
Sika deer	*Cervus nippon*
Spanish bluebell	*Hyacinthoides hispanica*
Three-cornered leek	*Allium triquetrum*
Water fern	*Azolla filiculoides*
Zebra mussel	*Dreissena (Dreissena) polymorpha*

2.1.5 Fauna in the Study Area

2.1.5.1 Mammals

A search of NBDC online database was conducted for records of Annex II and IV species protected under the EU Habitats Directive and other species protected under the Wildlife Act 1976 (as amended). The following species were recorded on NBDC within the study area:

- Short Beaked Common Dolphin (*Delphinus delphis*) and White-sided Dolphin (*Lagenorhynchus acutus*) are protected under the Wildlife Act and Annex IV of the EU Habitats Directive. These species were recorded within Galway Bay. These are marine species and direct impacts are unlikely, however there is potential for indirect impacts from water pollution of the aquatic environment from the construction of a proposed cycleway.

- Harbour seal (*Phoca vitulina*) and Loggerhead Turtle (*Caretta caretta*) are protected under the Wildlife Act and both Annex II and Annex V of the EU Habitats Directive. These species were recorded within Galway Bay. These are marine species and therefore direct impacts are unlikely, however there is potential for indirect impacts from water pollution of the aquatic environment from the proposed cycleway.
- European Otter *(Lutra lutra)* is protected under the Wildlife Act and both Annex II and Annex IV of the EU Habitats Directive. Pine Marten *(Martes martes*) and Irish Hare (*Lepus timidus*) are protected under the Wildlife Act and Annex V of the EU Habitats Directive. A 10m terrestrial buffer along lake shorelines and along river banks is critical for otters (NPWS, 2007), therefore there is potential for direct and indirect impacts to otters arising from the proposed cycleway.
- A number of bat species were also recorded in the study area including Nathusius Pipistrelle (*Pipistrellus nathusii*), Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Brown Long-eared Bat (*Plecotus auritus*), Daubenton's Bat (*Myotis daubentoni*), Whiskered Bat (*Myotis mystacinus*), Natterer's Bat (*Myotis nattereri*), Leisler's Bat (*Nyctalus leisleri*) and Lesser Horseshoe Bat (*Rhinolophus hipposideros*). All bat species are protected under the Wildlife Act and under Annex IV of the EU Habitats Directive. Lesser Horseshoe bat is also protected under Annex IV of the EU Habitats Directive. The bat species recorded within the study area may be found foraging along the banks of rivers or near woodland. These bat species may be found roosting in buildings, bridges, quay walls and mature trees.
- Red Deer (*Cervus elaphus*), Sika Deer (*Cervus nippon*), Fallow Deer (*Dama dama*), West European Hedgehog (*Erinaceus europaeus*), Eurasian Badger (*Meles meles*), Irish Stoat (*Mustela erminea*), Eurasian Red Squirrel (*Sciurus vulgaris*) and Eurasian Pygmy Shrew (*Sorex minutus*) are protected under the Wildlife Act 1976 (as amended).

2.1.5.2 Birds

All bird species are protected under the Wildlife Act 1976 (as amended) and the Birds Directive. BirdWatch Ireland and the RSPB Northern Ireland have produced a list of Birds of Conservation Concern in Ireland (BoCCI). A number of bird species are also categorised as Red or Amber listed Birds of Conservation Concern.

There were a number of bird species recorded within the study area from the NBDC, see Appendix B in Volume B – Constraints Study Report. Recorded Bird Species listed on Annex I of the Birds Directive 2009/147/EC include Common Kingfisher (*Alcedo atthis*), Greenland White-fronted Goose (*Anser albifrons flavirostris*), Short-eared Owl (*Asio flammeus*), Ruff (*Calidris pugnax*), Cory's Shearwater (*Calonectris borealis*), Black Tern (*Chlidonias niger*), Eurasian Marsh Harrier (*Circus aeruginosus*), Hen Harrier (*Circus cyaneus*), Corncrake (*Crex crex*), Bewick's Swan (*Cygnus columbianus bewickii),* Whooper Swan (*Cygnus cygnus*), Little Egret (*Egretta garzetta*), Merlin (*Falco columbarius*), Peregrine (*Falco peregrinus*), Red-footed Falcon (*Falco vespertinus*), Black-throated diver (*Gavia arctica*), Great northern Diver (Gavia immer), Red-throated Diver (Gavia stellata), White-tailed Eagle (*Haliaeetus albicilla*), Mediterranean Gull (*Larus melanocephalus),* Little Gull (*Larus minutus*), Bar-tailed Godwit (*Limosa lapponica),* Smew (*Mergellus albellus),* Ruff *(Philomachus pugnax),* European Golden Plover *(Pluvialis apricaria),* Slavonian Grebe (*Podiceps auratus),* Spotted Crake (*Porzana porzana),* Little Tern (*Sternula albifrons),* Common Tern (*Sterna hirundo),* Arctic Tern (*Sterna paradisaea)* and Sandwich Tern (*Sterna sandvicensis).*

There are sixteen SPAs within the study area. These sites along with the SCI (Special Conservation Interest) species which they are designated for are shown in **Table 2-1**.

There are numerous records of Kingfishers within the study area, who are commonly found along streams, canals and rivers (see Appendix B in Volume B – Constraints Study Report). They breed in tunnels dug in vertical banks along streams and rivers. There is potential for this species to occur along rivers and tributaries within the study area. Surveys for suitable nesting habitat may be required.

These species will be critical receptors to the proposed scheme where they are found within the study area through field surveys or where there is habitat potential to support these species. Potential impacts to these species will be assessed in the AA reporting and biodiversity impact assessments for the project.

2.1.5.2.1 Middle Shannon Callows SPA

Routes 4 and 5 are proposed along the ESB flood embankment on the west of the River Shannon between Portumna and Meelick. The study area for these routes is adjacent to the Middle Shannon Callows SPA. The

area was highlighted early in the planning process due to its high ecological value and the sensitivity of its SCI species to disturbance.

Initial consultation has been carried out with the NPWS in May of 2021. The memo detailing the proposed works and the minutes of the meeting are contained within Volume G – Other Stakeholder Consultation.

This section of the proposed cycleway is along the existing Hymany Way walking trail. It is proposed to construct the cycleway between the existing ESB flood embankment and a drain. In some locations a paved access road exists between the embankment and the drain. Cross sections for the potential Cycleway are shown in **Figure 2.1** (in areas with the existing road) and **Figure 2.2** (in areas without the existing road). The proposal at this location is for a 3m wide Cycleway with a 1m verge either side on the western side of the embankment.

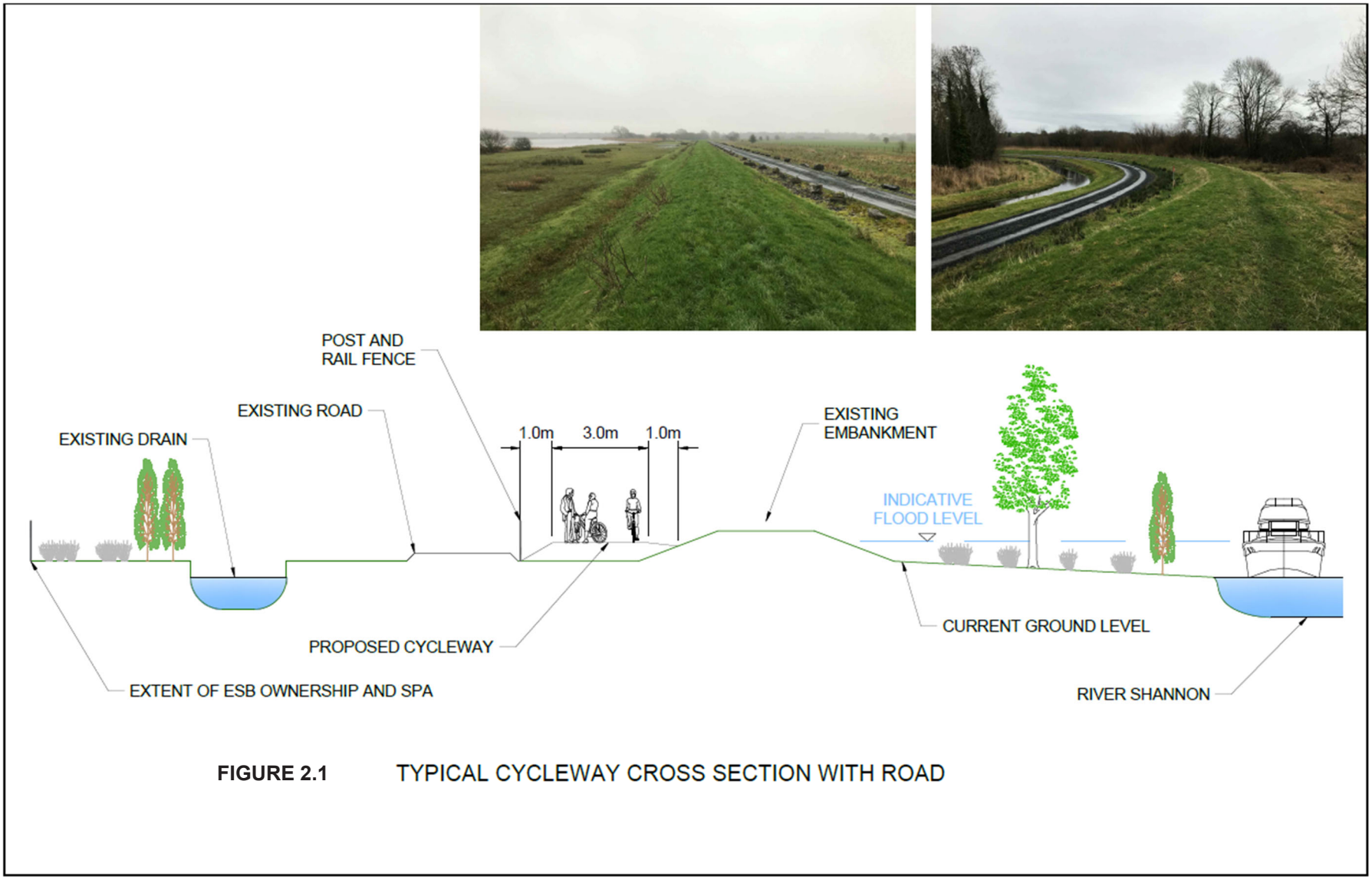

FIGURE 2.1 TYPICAL CYCLEWAY CROSS SECTION WITH ROAD

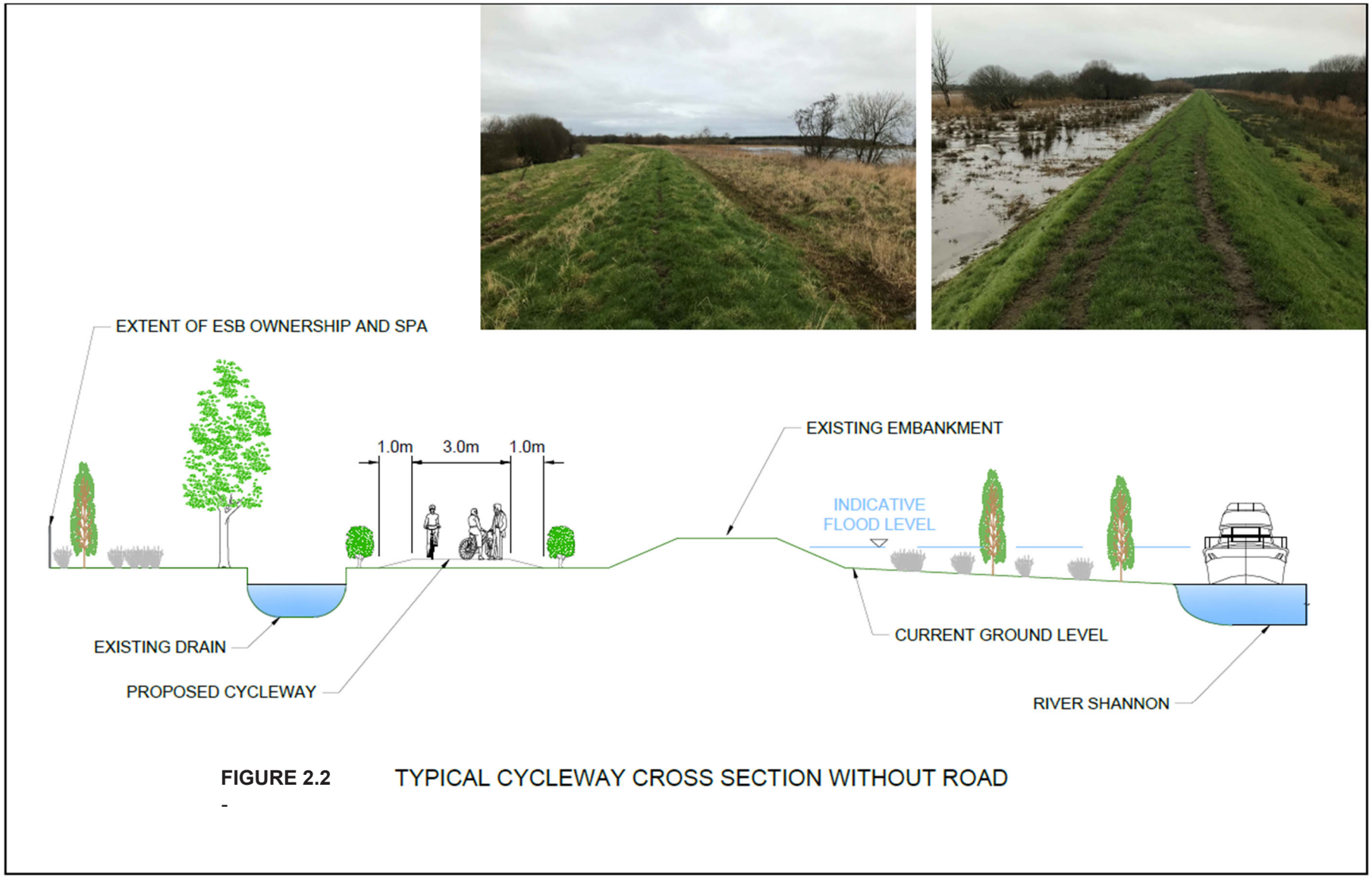

FIGURE 2.2 TYPICAL CYCLEWAY CROSS SECTION WITHOUT ROAD

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RPS commissioned Kendrew Colhoun of KRC Ecological Ltd., to prepare an ornithological scoping document for the Banagher to Portunma proposed section of the Cycleway. The report investigates the numbers and distribution of a range of wintering and breeding birds in the Middle Shannon Callows SPA and the potential effects of increased human recreational activity on these bird populations, sensitivity to disturbance and other pressures. The Executive Summary of the report is as follows:

'The numbers and distribution of a range of wintering and breeding birds in the Middle Shannon Callows is reviewed based on published sources. The potential effects of increased human recreational activity (associated with a proposed Greenway route) is considered in relation to the importance of the Banagher – Portumna section of the Shannon for bird populations, their sensitivity to disturbance and other threats and pressures.

While the Shannon Callows are of national and international significance for wintering waterbirds, the available evidence indicates that the section from Big Island to Portumna is of lesser importance for the majority of designated site feature species. The numbers of Whooper Swan and Wigeon are typically low and variable and these species are much more abundant in the callows further north (north of Banagher) or along the Little Brosna. Large flocks of Lapwing and Golden Plover do occur in this area but these species are highly mobile, their counts difficult to assign to precise areas and are considered unlikely to be negatively impacted by increased recreational activity associated with a greenway.

The most important area for wintering waterbirds generally is from Big Isle north to Banagher; the area around Big Island/Friar's Island/Victoria Lock at the confluence of the Little Brosna and Shannon Callows used to periodically hold Greenland White-fronted Geese (a highly important population sensitive to disturbance) but no longer does so in significant numbers.

Corncrakes no longer occur as a breeding species in the area and Whinchat are scarce in the Banagher-Portumna section. Breeding wader populations have undergone significant declines and the areas from Big Isle/Victoria lock to Banagher (especially the section Shannongrove / Esker and Banagher running for about 5km west of Banagher) are nationally important. These species are highly vulnerable to disturbance and this area is undoubtedly the most important area of lowland wet grassland for breeding waders in the Republic of Ireland.

A review of available data and published evidence suggests that the proposed route between Portumna and Big Isle would have little effect on bird species in the area throughout the year assuming activities are limited to pedestrian and pedal cycles only. Adequate signage and avoidance of key sites (esp for breeding waders) are essential to avoid negative impacts and case studies where this has been effective are described.

The section around the confluence of the Little Brosna and Shannon Callows/Victoria Lock is significant in winter and summer, especially to larger numbers of wintering waterbirds, Whinchat and breeding waders. The callows section from Big Isle to Banagher is also the most important for wintering waterbirds. Mitigation is required and likely, unless the need eliminated on the basis of detailed surveys, this area should be avoided and take cognisance of the distribution of wintering and breeding species. The breeding wader areas between Victoria Lock and Banagher hold regionally and nationally important numbers of breeding waders. These species are especially vulnerable to human disturbance and it is essential that potential walking routes avoid encroaching on these areas.

More detailed assessments will be needed to identify any (currently unknown) species occur along the route and mitigation considered. In particular this should include detailed surveys of breeding waders and Whinchat, focussing on the section between Meelick and Banagher. The greenway route in this section needs to be carefully selected to avoid core wader areas (and should allow for future expansion) and ensure that no other features of interest (such as rare breeding or wintering species which may have been overlooked in this review).

The report details the area around Big Island/Friar's Island/Victoria Lock at the confluence of the Little Brosna and Shannon Callows as the most important for wintering birds and therefore options have been investigated in the planning for routes 4 and 5 to avoid these areas. The full report is in **Appendix F1.1**.

Further winter birds surveys are currently taking place. These will inform the findings of the initial scoping report. Should mitigation or screening be required these can be carried out at design stage. In cases of sensitive locations, local re-routing can place the cycleway on the opposite side of the drain away from the SPA boundary.

2.1.5.2.2 Slieve Aughty Mountains SPA

Routes 4 and 5 cross the Slieve Aughty Mountains SPA. The area is a mix of commercial deciduous forestry and open bog interlaced with existing public and private trackways. The SPA is designated for the Hen Harrier (*Circus cyaneus*) and Merlin (*Falco columbarius*) SCI species. In the planning for the routes, consultation was carried out with Coillte and the Hen Harrier Project to provide routes through the area which are mostly on existing forestry access roads, fire lines or public roads. In doing so the routes avoid the foraging or nesting habitat for the SCI species. One potential route to the south and west of the Slieve Aughty Bog NHA borders open bog but the proposed route at this location is along an existing firebreak and adjacent to commercial forestry with limited potential impact on the SCI species.

Further survey work will be carried out to determine if mitigation measures, compensation areas or local re-routing will be required at detailed design stage. Construction of any such route would also adhere to bird nesting and breeding season.

2.1.5.3 Aquatic Habitats and Species

There are 123 rivers, streams and tributaries within the study area, the most significant of these being the Shannon, Suck, Shiven, Clarin, Dunkellin and Clare rivers. There are also a number of large lakes including Lough Rea and Lough Derg. These waterbodies support habitat for a number of Annex II and Annex IV including White-clawed Crayfish (*Austropotamobius pallipes*), Lamprey species (*Lampetra sp.*), Salmon (*Salmo salar*) and otter. European Eel (*Anguilla Anguilla*) is also recorded from these watercourses which is red listed as critically endangered. There is one record for a Freshwater Pearl Mussel (*Margaritifera margaritifera*) population from the NPWS database, within the study area at the Shannon – Woodford catchment. The current status of this species within the catchment is unknown.

These aquatic species have potential to be indirectly impacted by the proposed cycleway as there are a number of watercourses throughout the study area.

2.1.5.4 Invertebrates

Marsh Fritillary (*Euphydryas aurinia*) is protected under Annex II of the EU Habitats Directive and is red listed as vulnerable. Geyer's Whorl Snail (*Vertigo geyeri*) and Desmoulin's Whorl Snail (*Vertigo moulinsiana*) are protected under the Wildlife Act and Annex II and V of the EU Habitats Directive. Geyer's Whorl Snail is red listed as vulnerable and Desmoulin's Whorl Snail is red listed as endangered.

These species all have potential to be impacted by the proposed cycleway.

2.1.5.5 Reptiles and Amphibians

There are three species of amphibian in Ireland, Common Frog (*Rana temporaria*), Smooth Newt (*Lissotriton vulgaris*) and the Natterjack Toad (*Bufo calamita*). Natterjack Toad only occurs in Co. Kerry and Co. Wexford. There is only one native reptile in Ireland, Common Lizard (*Zootoca vivipara*) and there is one non-native reptile, Slow Worm (*Anguis fragilis*).

Common Frog (*Rana temporaria*), Common Newt (*Triturus vulgaris*) and Common Lizard (*Zootoca vivipara*) are recorded within the study area. They are protected under the Wildlife Act.

Frogs prefer wet and damp habitats that contain shallow edged ponds with plenty of plants and algae surrounding them. Frogs breeding sites include ponds, streams, drains, bog pools and ditches. The land surrounding their pond or breeding site is usually rough with long grass and some scrub to provide cover while foraging. Frogs hibernate in hedgerows, large stones and old logs.

Common Newt prefers habitats including standing waters such as lake margins, ponds and ditches for breeding. However, outside of the breeding season they will use a variety of habitats including parks, farmland, wet heathland, bogs, marshes, gardens and deciduous woodland.

Common Lizard prefers damp habitats such as damp grassland, woodland tracks, peat bogs and heathlands. The lizard is widely distributed throughout Ireland and feeds on small invertebrates.

There are suitable habitats for Common Frog, Common Newt and Common Lizard within the study area and therefore there is potential for these species to be impacted by the proposed cycleway.

2.1.5.6 Bats

All Irish bat species are protected under the Wildlife Act (1976) as amended. Also, the Habitats Directive 92/43/EEC, as transposed, seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. Lesser Horseshoe Bats are listed under Annex II of the Habitats Directive and all bat species are listed in Annex IV. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Nine of the eleven known Irish bat species have been recorded within the study area. Twenty-two lesser horseshoe bat roosts have been recorded within the study area by the NPWS (See Appendix B in Volume B – Constraints Study Report).

There may be potential habitat impacts to foraging and commuting habitat in relation to bat species, the extent of these impacts will be examined through further survey and assessment.

3 OPTION SELECTION

3.1 Route option 1

Route 1 moves south-westward from the western side of the River Shannon at Athlone, crosses the River Suck to the southeast of Ballinasloe, travels northwest-ward through Ballinasloe and covers an area of north County Galway that includes Ahascragh, Caltra, Castleblakeney and Mountbellew. From here it turns south-westward, traversing the lands south of the M6 between Athenry and Oranmore before arriving at Merlin Park at the east of Galway City.

The study area for Route 1 crosses three SAC boundaries including the Galway Bay Complex SAC which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The route is adjacent to the Lough Corrib SAC boundary and crosses the SAC at one point over an existing bridge. The route is also in close proximity to the River Shannon Callows SAC between Shannonbridge and Athlone. The proximity of all three of these SAC's to the proposed route gives a rating of most potential concern for direct impacts to the hydrological and hydrogeological regime.

The study area for this route crosses three SPA's including the River Suck Callows SPA which is crossed by all five route corridors at various locations, the Inner Galway Bay SPA which is crossed by all five route corridors from Oranmore to Ballyloughane beach and the Middle Shannon Callows SPA. The proximity of all three of these SPA's to the proposed route gives a rating of most potential concern for direct impacts to the SCI species.

The study area for this route intersects with six NHA's boundaries while the route crosses on mostly existing tracks or bridge on four of these NHA's including Carrickynaghtan Bog NHA, Suck River Callows NHA, Crit Island West NHA and Annaghbeg Bog NHA. The route at Castle Ffrench East Bog NHA and Killure Bog NHA are proposed on the boundary of the designated site.

The proposed route at the majority of the above locations is confined to existing roads and tracks or, are at a considerable distance from the boundary. They do however have the potential to have a direct and indirect impact on the designated sites. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can eliminate any potential impacts. The proposal for any new tracks will be assessed individually to ensure no damage to qualifying interests of the designated site and re-routed where necessary.

The proposed route passes on existing tracks in close proximity (less than 150m) from the boundary of the Monivea Bog SAC. Should these tracks require upgrade, mitigation measures will be provided.

3.2 Route option 2

Route 2 follows the line of the railway line between Athlone and Galway, passing through Ballinasloe, Woodlawn, Attymon, Athenry and Oranmore on the way. This is the shortest and the most direct of the five proposed routes and its study area covers the least area.

The study area for Route 2 crosses one SAC boundary, namely the Galway Bay Complex SAC which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The proximity of this SAC to the proposed route gives a rating of most potential concern for direct impacts to the hydrological and hydrogeological regime.

The study area for this route crosses two SPA's including the Inner Galway Bay SPA and the River Suck Callows SPA which are both crossed by all route options. The proximity of these SPA's to the proposed route gives a rating of most potential concern for direct impacts to the SCI species.

The study area for this route intersects with one NHA boundary; the Suck River Callows NHA, which is also crossed by all route options at various locations. The crossing for this route option is adjacent to the existing rail line crossing over the River Suck east of Ballinasloe.

The proposed route at all above locations are confined to existing roads and tracks or, are at a considerable distance from the boundary. They do however have the potential to have a slight to limited direct and indirect impact on the designated sites. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can eliminate any potential impacts.

3.3 Route option 3

Route 3 follows the same alignment as Route 1 between Athlone and Ballinasloe, after which it moves in a westerly direction towards Galway, covering a large swathe of land between the Athlone to Galway railway line and the M6 Motorway. As well as the towns and villages traversed by Route 2, the study area for Route 3 includes Aughrim, Kilconnell, Newinn and Ballyfa.

The study area for Route 3 crosses two SAC boundaries including the Galway Bay Complex SAC which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The route is also in close proximity to the River Shannon Callows SAC between Shannonbridge and Athlone. The proximity of these SAC's to the proposed route gives a rating of most potential concern for direct impacts to the hydrological and hydrogeological regime.

The study area for this route crosses three SPA's including the River Suck Callows SPA which is crossed by all five route corridors at various locations, the Inner Galway Bay SPA which is crossed by all five route corridors from Oranmore to Ballyloughane beach and the Middle Shannon Callows SPA. The proximity of all three of these SPA's to the proposed route gives a rating of most potential concern for direct impacts to the SCI species.

The study area for this route crosses on existing tracks or bridge on three NHA's including Carrickynaghtan Bog NHA, the Suck River Callows NHA and Raford River Bog NHA.

The proposed route at all above locations are confined to existing roads and tracks or, are at a considerable distance from the boundary. They do however have the potential to have a slight to limited direct and indirect impact on the designated sites. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can eliminate any potential impacts.

3.4 Route option 4

Route 4 takes the same alignment as Route 1 southward from Athlone almost to the River Suck. From there the route turns east, crossing the River Shannon into Shannonbridge and then back again via an industrial railway bridge a few kilometres southeast of Shannon Bridge. From here, the route skirts the western bank of the River Shannon, through Meelick and into Portumna. From Portumna in a westerly direction the route passes the northern shore of Lough Derg before travelling northwest-ward through Woodford, Loughrea and into Athenry.

The study area for Route 4 crosses nine SAC boundaries including the Galway Bay Complex SAC which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The route is also in close proximity or through the Barroughter Bog SAC and Cloonmoylan Bog SAC near Portumna, Derrycrag Wood Nature Reserve SAC near Woodford, Lough Derg, North East Shore SAC near Portumna, Lough Rea SAC in Loughrea, Pollnaknockaun Wood Nature Reserve SAC near Woodford, River Shannon Callows SAC between Athlone and Portumna and Rosturra Wood SAC near Woodford. The proximity of these SAC's to the proposed route gives a rating of most potential concern for direct impacts to the hydrological and hydrogeological regime.

The study area for this route crosses six SPA's including the River Suck Callows SPA which is crossed by all five route corridors at various locations. This route crosses the Inner Galway Bay SPA which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The proximity of all six of these SPA's to the proposed route gives a rating of most potential concern for direct impacts to the SCI species.

The route is also close to the River Shannon Callows SAC and the Middle Shannon Callows SPA will also require further field work to determine the options at this location. Should it be necessary, due to habitat or bird survey outcomes, the local re-routing at specific locations will be considered.

Careful consideration is also required on the shores of Lough Rea SAC / SPA in Loughrea where the proposed route is planned on the existing road. The space at this location is limited and mitigation will be required.

This route also crosses the Slieve Aughty Mountains SPA mostly on existing forestry access roads, fire lines or public roads. In doing so the routes avoid the foraging or nesting habitat for the SCI species. Further survey work will be carried out to determine if mitigation measures, compensation areas or local re-routing will be required at detailed design stage. Construction of any such route would also adhere to bird nesting and breeding season.

Additional surveying, design and mitigation will be required in areas where the route is traversing or directly impacting a designated site. This includes for the existing track routes in Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA, Rosturra Wood SAC and Pollnaknockaun Wood Nature Reserve SAC where the track may need to be upgraded.

The study area for this route intersects with five NHA's boundaries while the route crosses on existing tracks or bridge on two of these NHA's including Carrickynaghtan Bog NHA and the Suck River Callows NHA. The route at Slieve Aughty Bog NHA, Meeneen Bog NHA and Kilnaborris Bog NHA are proposed on the boundary of the designated sites.

The proposed route at the majority of the above locations is confined to existing roads and tracks or, are at a considerable distance from the boundary. They do however have the potential to have a direct and indirect impact on the designated sites. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can potentially eliminate any impacts.

3.5 Route option 5

Route 5 takes a similar alignment to Route 4 from Athlone through Portumna as far as Derrybrien at the southern foothills of the Slieve Aughty Mountains. It moves west into Gort, then northward through Kinvarra, Kilcolgan, Clarinbridge and on to Oranmore and Galway.

The study area for Route 5 crosses 15 No. SAC boundaries including the Galway Bay Complex SAC which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The route is also in close proximity or through the Barroughter Bog SAC and Cloonmoylan Bog SAC near Portumna, Caherglassaun Turlough SAC west of Gort, Carrowbaun, Newhall and Ballylee Turloughs SAC north of Gort, Coole-Garryland Complex SAC west of Gort, Derrycrag Wood Nature Reserve SAC near Woodford, East Burren Complex SAC west of Gort, Kiltartan Cave (Coole) SAC northwest of Gort, Lough Coy SAC northeast of Gort, Lough Derg, North East Shore SAC near Portumna, Lough Fingall Complex SAC near Ballinderreen, Pollnaknockaun Wood Nature Reserve SAC near Woodford, River Shannon Callows SAC between Athlone and Portumna and Rosturra Wood SAC near Woodford. The proximity of the majority of these SAC's to the proposed route gives a rating of most potential concern for direct impacts to the hydrological and hydrogeological regime. Some SAC's (Carrowbaun, Newhall and Ballylee Turloughs SAC, Kiltartan Cave (Coole) SAC and Lough Coy SAC) have been given a rating of intermediate concern for direct and indirect impacts due to the distance of the proposed route from the SAC boundary.

The study area for this route crosses seven SPA's including the River Suck Callows SPA which is crossed by all five route corridors at various locations. This route crosses the Inner Galway Bay SPA which is crossed by all five route corridors from Oranmore to Ballyloughane beach. The proximity of all seven of these SPA's to the proposed route gives a rating of most potential concern for direct impacts to the SCI species.

The route is also close to the River Shannon Callows SAC and the Middle Shannon Callows SPA will also require further field work to determine the options at this location. Should it be necessary, due to habitat or bird survey outcomes, the local re-routing at specific locations will be considered.

This route also crosses the Slieve Aughty Mountains SPA mostly on existing forestry access roads, fire lines or public roads. In doing so the routes avoid the foraging or nesting habitat for the SCI species. Further survey work will be carried out to determine if mitigation measures, compensation areas or local re-routing will be required at detailed design stage. Construction of any such route would also adhere to bird nesting and breeding season.

Additional surveying, design and mitigation will be required in areas where the route is traversing or directly impacting a designated site. This includes for the proposed route through Caherglassaun Turlough SAC where the route is through the turlough on existing track for the majority with the remaining 225m length is new track along a hedgerow. Similarly, the route through Coole-Garryland Complex SAC / SPA is on existing tracks which may require upgrade.

Additional surveying, design and mitigation will be required for the existing track routes in Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA, Rosturra Wood SAC and Pollnaknockaun Wood Nature Reserve SAC where the track may need to be upgraded.

This route travels on the existing main road in close proximity (less 100m) to the Lough Fingall Complex SAC boundary and approximately 200m to the Cregganna Marsh SPA. Should any local re-routing of the cycleway in these areas be required it will be necessary to route away from the SAC / SPA boundary.

The study area for this route intersects with six NHA's boundaries while the route crosses on existing tracks or bridge on two of these NHA's including Carrickynaghtan Bog NHA and the Suck River Callows NHA. The route at Slieve Aughty Bog NHA, Meeneen Bog NHA, Kilnaborris Bog NHA and Cregganna Marsh NHA are proposed on or near the boundaries of the designated sites.

The proposed route at the majority of the above locations is confined to existing roads and tracks or, are at a considerable distance from the boundary. They do however have the potential to have a direct and indirect impact on the designated sites. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can potentially eliminate any impacts.

4 CONCLUSION

The European sites and designated sites within the study area are a significant constraint on the proposed cycleway, especially in relation to loss of Annex habitats and disturbance to SCI species.

There are 66 European sites (SAC / SPA) and 63 designated sites NHA / pNHA) within the study area. The number of European and designated sites crossed by each route study areas are given in **Table 4-1**. There are also four nature reserves and four Ramsar sites within the study area.

Table 4-1: Number of European and Designated Sites Crossed by each Route Study Area

Designation	No. within Route 1 Study Area	No. within Route 2 Study Area	No. within Route 3 Study Area	No. within Route 4 Study Area	No. within Route 5 Study Area
SAC	3	1	2	9	15
SPA	3	2	3	6	7
NHA	6	1	3	5	6
pNHA	4	2	3	9	11

Routes 4 and 5 have considerably more interaction with European and designated sites as opposed to Routes 1, 2 and 3. Routes 4 and 5 also cross the River Shannon Callows SAC and the Middle Shannon Callows SPA between Athlone and Portumna. This area was highlighted early in the planning process due to its high ecological value and the sensitivity of its SCI species to disturbance.

The proposed route at this location is confined to the existing Hymany Way walking track. The route does however have the potential to have a direct and indirect impact on the qualifying interests of the SAC. Field surveying and local re-routing for avoidance at design stage and mitigation measures at construction stage can potentially eliminate any impacts.

Further winter bird surveys are currently taking place. These will inform the findings of the initial scoping report carried out. Should mitigation or screening be required these can be carried out at design stage. In cases of sensitive locations, local re-routing can place the cycleway on the opposite side of the drain away from the SPA boundary.

Routes 4 and 5 also cross the Slieve Aughty Mountains SPA mostly on existing forestry access roads, fire lines or public roads. In doing so the routes avoid the foraging or nesting habitat for the SCI species. Further survey work will be carried out to determine if mitigation measures, compensation areas or local re-routing will be required at detailed design stage. Construction of any such route would also adhere to bird nesting and breeding season.

Careful consideration is also required on the shores of Lough Rea SAC / SPA in Loughrea where the proposed route 4 is planned on the existing road. The space at this location is limited and mitigation will be required.

All five route corridors options cross the Galway Bay Complex SAC / Inner Galway Bay SPA from Oranmore to Ballyloughane beach. The study area for route 5 continues south along the coastline coinciding with the SAC / SPA boundary while the remaining four routes' head inland eastwards. As the proposed route 5 is intended to be on existing tracks and roads and mostly inland it is expected to have a slight to limited direct or indirect impact on the designated site.

All remaining interactions with designated sites along all routes (both existing or new tracks) are expected to have a slight to limited direct or indirect impact due to the low level of construction requirements for cycleways which rarely result in excessive cut of fill operations. Any impacts encountered can be resolved at design stage with local re-routing, mitigation measures or considerate design. This includes for the proposed route through Caherglassaun Turlough SAC where the route is through the turlough on existing track for the majority with the remaining 225m length is new track along a hedgerow.

In addition to the habitats and species protected under designated sites, there are numerous records for rare and protected species which will require further assessments for habitats and protected flora species, Wildlife Act species or species listed Annex II/IV/V of the EU Habitats Directive, as well as protected bird species under the Birds Directive and important bird assemblages that are likely to be found within the study area. A number of habitats that correspond with Annex I habitat types may also be found within or outside SACs within the study area.

All designated sites and other features of ecological interest should be considered in full when identifying suitable routes for the cycleway. Avoidance of all designated sites and important ecological features should

be prioritised where possible. In the event where works located within or in proximity to designated sites and ecological features appropriate mitigation measures should be implemented to avoid or minimise effects.

Non-native invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011, as amended, were recorded within the study area. Further surveys will be required to inform the design and identify potential interactions with the infected sites. A management plan will need to be prepared to ensure compliance with Regulation 49 of the 2011 Regulations.

Water quality impacts to receiving waters in the study area have the potential to significantly impact protected species/habitats which may be present.

Further assessments for habitats, identified protected flora species, Wildlife Act species or Annex II/IV of the EU Habitats Directive species will be required as well as waterbird species assemblages that are likely to be found within the study area.

Appendix F1.1

Athlone – Galway Greenway; Ornithological scoping report (Banagher – Portumna) by Kendrew Colhoun, 2021

Athlone – Galway Greenway; Ornithological scoping (Banagher – Portumna)

12/05/2021

Report to RPS

Kendrew Colhoun

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Executive Summary

The numbers and distribution of a range of wintering and breeding birds in the Middle Shannon Callows is reviewed based on published sources. The potential effects of increased human recreational activity (associated with a proposed Greenway route) is considered in relation to the importance of the Banagher – Portumna section of the Shannon for bird populations, their sensitivity to disturbance and other threats and pressures.

While the Shannon Callows are of national and international significance for wintering waterbirds, the available evidence indicates that the section from Big Island to Portumna is of lesser importance for the majority of designated site feature species. The numbers of Whooper Swan and Wigeon are typically low and variable and these species are much more abundant in the callows further north (north of Banagher) or along the Little Brosna. Large flocks of Lapwing and Golden Plover do occur in this area but these species are highly mobile, their counts difficult to assign to precise areas and are considered unlikely to be negatively impacted by increased recreational activity associated with a greenway.

The most important area for wintering waterbirds generally is from Big Isle north to Banagher; the area around Big Island/Friar's Island/Victoria Lock at the confluence of the Little Brosna and Shannon Callows used to periodically hold Greenland White-fronted Geese (a highly important population sensitive to disturbance) but no longer does so in significant numbers.

Corncrakes no longer occur as a breeding species in the area and Whinchat are scarce in the Banagher-Portumna section. Breeding wader populations have undergone significant declines and the areas from Big Isle/Victoria lock to Banagher (especially the section Shannongrove/Esker and Banagher running for about 5km west of Banagher) are nationally important. These species are highly vulnerable to disturbance and this area is undoubtedly the most important area of lowland wet grassland for breeding waders in the Republic of Ireland.

A review of available data and published evidence suggests that the proposed route between Portumna and Big Isle would have little effect on bird species in the area throughout the year assuming activities are limited to pedestrian and pedal cycles only. Adequate signage and avoidance of key sites (esp for breeding waders) are essential to avoid negative impacts and case studies where this has been effective are described.

The section around the confluence of the Little Brosna and Shannon Callows/Victoria Lock is significant in winter and summer, especially to larger numbers of wintering waterbirds, Whinchat and breeding waders. The callows section from Big Isle to Banagher is also the most important for wintering waterbirds. Mitigation is required and likely, unless the need eliminated on the basis of detailed surveys, this area should be avoided and take cognisance of the distribution of wintering and breeding species. The breeding wader areas between Victoria Lock and Banagher hold regionally and nationally important numbers of breeding waders. These species are especially vulnerable to human disturbance and it is essential that potential walking routes avoid encroaching on these areas.

More detailed assessments will be needed to identify any (currently unknown) species occur along the route and mitigation considered. In particular this should include detailed surveys of breeding waders and Whinchat, focussing on the section between Meelick and Banagher. The greenway route in this section needs to be carefully selected to avoid core wader areas (and should allow for future expansion) and ensure that no other features of interest (such as rare breeding or wintering species which may have been overlooked in this review).

Scope: This project was undertaken for RPS to scope the potential risks/impacts and ecological constraints a cycleway might have on ornithological interests in the area. Specifically, this includes (1) reviewing the status, trends, threats and pressures to bird species which occur in the area (especially species of conservation interest SCIs), (2) reviewing using published sources the sensitivity of SCIs to cyclist/walker disturbance, (3) case studies of similar projects and opportunities for monitoring/mitigation and enhancement.

1. Background:

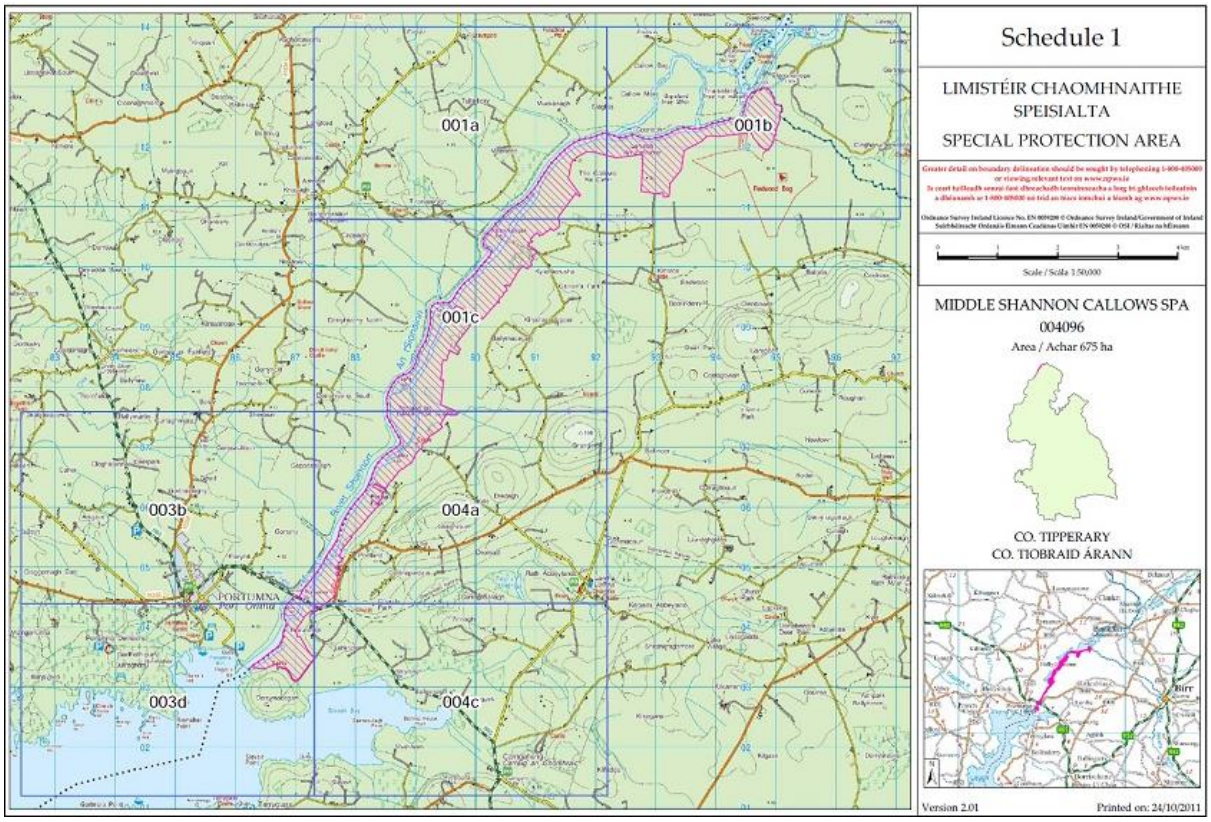
The Shannon is Ireland's longest river in Ireland, covering over 250km from the headwaters on the Cavan/Fermanagh border to first reaching the sea at the Shannon Estuary in Limerick and the ocean a further 80km between Clare and Kerry (Bowman 1998). Extending from Athlone to Potumna, this central section of the Shannon, known as the Middle Shannon Callows comprises around 50km of seasonally flooded grassland or callow (from the Irish *caladh*, river meadow) and covers an area of approximately 3,500 ha (Nairn *et al*. 1988). Between Lough Ree and Lough Derg the Shannon is generally a wide slow-moving river with few meanders, flanked by agricultural fields, meadows and raised bogs (Heery 1991). In summer the area looks like a dry grassland, pasture and hay meadow agricultural habitat, transforming to extensively flooded grassland in winter. The river in this section has minimal gradient (only 12m in 40km; Nairn *et al.* 1988) and its hydrological regime remains largely unaltered, though controlled somewhat by weirs at Meelick and Athlone. Flooding occurs annually each winter often throughout the period from autumn (usually between October and December) until spring (flooding has typically subsided by April), but also periodically in the summer months. They represent the largest area of semi-natural floodplain grassland in Ireland (ca 3,500 ha) and amongst the largest floodplains in Ireland and Britain (Heery 1993, Maher *et al.* 2014). In a global context, floodplains are key ecosystems of riverine landscapes, providing a wide range of ecosystem services (Hein *et al.* 2016). Their extent has changed dramatically over the last 100 years, with significant losses throughout Western Europe due mostly to land use change, river regulation and dam construction (Hein *et al.* 2016). As a consequence, the callows of Ireland's largest river remain a unique example of this rich endangered habitat comprising rich plant and bird communities.

The annual regime of winter grassland inundation by floodwaters and a relatively unintensive summer management of semi-natural plant communities have provided habitats for a very large year-round diversity of birds (Heery 1993, 2003). In recognition of their importance, the Shannon Callows are designated as a Special Protection Area (SPA) under the EU Birds (2009/147/EC) and a

Special Area of Conservation under the Habitats (92/43/EEC) Directives, holding internationally important populations of both wintering and breeding waterbirds in addition to wider biodiversity interests including various plant and invertebrates (Crowe 2005, Heery 1991, Heery 1993, Maher *et al.* 2014, Burke *et al.* 2019). The Middle Shannon Callows SPA (IE004096); 53.253, -8.0217), covers 5814.85ha overall and, of interest in respect to this report, is the section on the western border of Cos. Tipperary and Offaly, extending from Portumna north to Banager (Figures 1a, 1b), comprising < 1000ha of the river and its hinterland.

Figure 1. Middle Shannon Callows SPA IE004096; S.I. No. 41/2012 - European Communities (Conservation of Wild Birds (Middle Shannon Callows Special Protection Area 004096)) Regulations 2012. (irishstatutebook.ie) showing the northern section (a) from Banagher to Victoria Lock and (b) southern section from Victoria Lock to Portumna.

(a)



(b)

2. Review of status and distribution of birds in the area

An assessment of the primary ornithological features of the area was undertaken through a number of complimentary approaches: (1) a number of field visits to accessible sections to briefly survey wintering birds, take photographs and get a 'feel' for the landscape, (2) a desk review of existing data sources in published papers, reports and books, and (3) consultation with local experts familiar with the location currently and/or historically.

2.1 2021 Winter field visits

Three brief field visits were made in January 2021 primarily to review the site features and take photographs. Whilst on site all bird species were recorded. Site visits were to (a) the Portumna – Meelick Section (Galway/Tipperary) on 02 January 2021, (b) the Victoria Lock/Little Brosna area on the east bank of the Shannon (Offaly/Tipperary) on 16 January 2021 and (c) the Slaghta/Big Island section on the west bank of the Shannon (Galway) on 20 January 2021 (Figure 2). The birds recorded on each visit are shown in Table 1, with corresponding locations in Figure 3.

<u>Figure 2.</u> Approximate survey areas (field visits on 2nd (A: grey), 16th (B: blue) and 20th (C: green) January 2021) and locations of significant bird flock registrations (see Table 1).

Table 1. Waterbird counts made 3 brief visits to sections of the Banagher – Portumna section of the Shannon Callows in January 2021.

Area	Species	Count	Map Ref	Notes
A South (N Portumna)	Lapwing	46	Fig 3, point 1	flew from SE and landed
	Golden Plover	4	Fig 3, point 2	Larger flock calling but not seen
	Lapwing	260	Fig 3, point 3	Flushed
	Whooper Swan	14	Fig 3, point 4	In field
	Whooper Swan	150	Fig 3, point 5	In field
B Victoria Lock	Lapwing	120	Fig 3, point 6	flying
	Golden Plover	500	Fig 3, point 6	flying
C Slaghta/Big Island	Lapwing	100	Fig 3, point 7	flying
	Whooper Swan	12	"	On water
	Mallard	30	"	"
	Cormorant	5	"	"
	Little Egret	1	"	Water's edge
	Grey Heron	1	"	Water's edge
	Teal	25	"	On water
	Coot	?	"	Heard only on water

Numbers of birds were surprisingly low despite conditions being fine and disturbance levels low. The observed species were consistent with expectations, the most notable count being of 150 Whooper Swans NW of Portland Island (at 53.1254, -8.1735).

Figure 3. Location of bird counts in January 2021. Numbered positions correspond to the Map Ref column in Table 1.

Figure 4. View from Victoria Lock NW, January 2021.

2.2 Desk review of published sources on birds in the Middle Shannon Callows

2.2.a Wintering waterbirds

The wintering bird population has been census regularly including by Hutchinson (1979), Sheppard (1993) and almost annually since 1995/96. The Middle Shannon Callows consistently holds > 20,000 wintering waterbirds in each decade (1984-86: 28,453 (Sheppard 1993); 1994-98: 22,611 (Colhoun 2001); 1996-00: 20,432 (Crowe 2005)) and thus qualifies as an internationally important wetland based on overall waterbird numbers. The designated site wintering bird features (Schedule 3) are Whooper Swan, Wigeon, Golden Plover, Lapwing and Black-tailed Godwit.

Until recently, populations of three species occurred internationally important and a further three in nationally important numbers at the site (Crowe 2005; Table 2). However, based on five-year average counts up to 2015, only Mute Swans occur regularly in internationally important numbers; the other five species now occur in nationally important numbers.

Table 2. Changes in peak numbers of selected species on the Shannon Callows over 22 years 1994/95 – 2015/16; counts for each period are winter peaks; 2019/20 data is based on the maximum of 2 aerial surveys in that winter. Rank refers to all-Ireland ranking from 1994 to 2019. Data from Crowe (2005).

Species	2019	2009-15	1994-00	Rank
Internationally Important Numbers				
Mute Swan (90, 90) + 11.5%	412	739	407	top
Whooper Swan (340, 150) +39.6%	478	305	384	Now nat - top
Black-tailed Godwit (1,100, 200) +77.7%	0	220	490	Now nat 30th
Nationally Important Numbers				
Wigeon (140,000, 560) -39.2%	1,655	1,365	2,884	Nat 7th
Golden Plover (9,300, 920) -43.4%	7,000	1,650	2,841	8th
Lapwing (72,300, 850) -67.6%	1,730	7,672	14,218	Most imp

Recent I-WeBS counts covering the nine winters between 2004/05 and 2012/13 show that 16 species were recorded during aerial surveys, with the two sections combined holding on average 2,172 birds, over 3,700 birds in two years (2004/05 and 2012/13) and peaking at 4,798 birds in 2009/10 (Table 3). Of the designated site feature species national threshold levels were only exceeded by two species (Golden Plover and Lapwing) in these sections during the survey seasons.

Table 3. I-WeBS counts in two sections of the Middle Shannon Callows from (1) Portumna to Big Isle and (2) Big Isle to Banagher. SCI species are shown in *italics* and annual peaks exceeding national 1% threshold values are marked *. Data provided by the I-WeBS office.

Subsite/Species	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13
(1) Portumna - Big Isle									
Mute Swan	24	40	31	9	26	52	52	24	75
Whooper Swan	9	20	65				120	10	
Wigeon		50	10			490	120	58	
Teal	80	3				260	12	61	
Mallard	16	15	8		11		2	7	6
Little Grebe					4				
Cormorant	1	2	1		3		10		1
Grey Heron	2				2				
Coot	2								
Golden Plover			50			700			
Lapwing	1510*	240		15		450	15	200	170
Snipe					2				
Black-headed Gull	30		100	85	1	590	1	110	50
(2) Big Isle - Banagher									
Mute Swan	15	20	14	6	11	51	16	20	53
Whooper Swan	7					90			
Wigeon	78	40	480	90		200	800*	65	300
Teal					70	10	22		2
Mallard		2			15		13		
Cormorant	3						2		
Grey Heron					2	1			
Golden Plover		700		20	50	960*		200	1500*
Lapwing	1800*	1155*	304	10		867*	600	150	1350*
Dunlin				60					
Black-tailed Godwit	131						220		220
Curlew				45	9	2	1		
Black-headed Gull	40	195	2	209		75		55	7
Herring Gull			1						

Aerial surveys undertaken by BirdWatch Ireland/NPWS in January (23rd) and February (11th) 2019 (Edge *et al*. 2020) showed usage by nine species in these two sections with peak numbers varying between areas between the two surveys – highest in the northern (Big Isle – Banagher) section in January but then lower there several weeks later in February. Overall numbers peaked in February at 2,774 birds between the two sections combined.

In the context of the entire Callows (extending from Banagher to Athlone), the two sections held <= 23% of the total waterbirds counted on the entire Shannon Callows; seven species occurred in proportions >=20% of the overall Shannon Callows total on at least one of these counts, with over half of overall species totals occurring in the two sections of interest in the case of Mallard (89%), Black-headed Gull (86%), Teal (61%), Whooper Swan (55%) and Wigeon (54%).

As has historically been the case waterbird numbers were especially high in the Little Brosna Callows, with the Shannon Callows peaking at 12,302 birds in February 2019 (Figure 5). During these two surveys the sections south of Banagher held at most 14.5% of the total waterbird counts of the entire Shannon Callows (1,781 of 12,302 birds in Feb 2019) and as little as 1.2% (70 of 5,867 birds in Jan 2019) of the Shannon Callows total. In both surveys the areas north of Banagher held the majority of birds (Figure 6), the two sections Banagher – Shannonbridge and Athlone – Clonmacnoise combined accounting for 68-74% of the totals in January and February, respectively.

During these surveys the totals recorded exceeded the threshold of international importance (AEWA 2018) for Mute Swan and Whooper Swan on the River Shannon Callows overall, but only on sections north of Banagher. The national (all-Ireland) thresholds (Burke *et al.* 2019) were exceeded for four species along the River Shannon Callows - Wigeon, Teal, Golden Plover and Lapwing. Only a single count (of Whooper Swans in February) exceeded the current nationally important threshold in the sections south of Banagher.

Ground counts undertaken in the Shannon Callows (Athlone to Portumna) in December 2018 and February 2019 recorded 24 and 28 waterbird species, with total counts of 27,811 and 33,006 birds respectively (Edge *et al* 2020). Overall, three species occurred in numbers that exceed the threshold for international importance (Mute Swan, Whooper Swan and Golden Plover) and a further five species occurred in numbers that exceed the threshold for national importance. Though no tabulated data is available by sections, maps (Figure 7 in Edge *et al*. 2020) show the only significant counts of these species during these two surveys of Wigeon (<250), Black-tailed Godwit (< 100) and Lapwing (< 600).

The winter surveys by Edge *et al*. (2020) also included boat-based surveys of the main channel (including Portumna – Victoria Lock) and car-based transects of the section from Portumna – Banagher. No significant additional data was derived from these counts with the exception of a single count of 1,800 Lapwing on fields near Big Isle.

Table 4. BWI/NPWS aerial surveys in winter 2018/19 in two sections of the Middle Shannon Callows from (1) Portumna to Big Isle and (2) Big Isle to Banagher. SCI species are shown in *italics* and annual peaks exceeding national 1% threshold values are marked *. Data from Edge *et al*. (2020).

Date	Species	Portumna - Big Isle	Big Isle - Banagher
23rd January	Mute Swan	7	7
	Whooper Swan	61	2
	Wigeon		154
	Teal		30
	Mallard		6
	Grey Heron	2	
	Black-headed Gull		221
	Total	**70**	**420**
11th February	Mute Swan	48	31
	Whooper Swan	175*	
	Wigeon	400	335
	Teal	100	300
	Mallard	105	31
	Cormorant	1	1
	Golden Plover	500	0
	Lapwing	450	160
	Black-headed Gull	2	135
	Total	**1781**	**993**

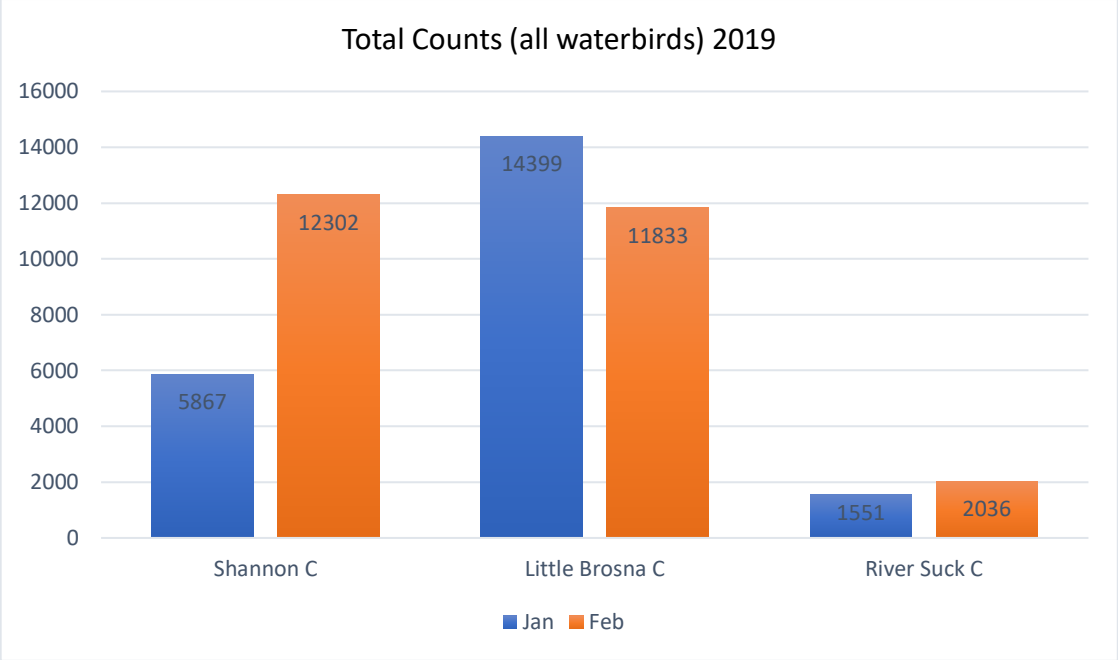


Figure 5. Summed waterbird counts on BWI/NPWS aerial surveys in winter 2018/19 in January and February at three main areas – Shannon Callows, Little Brosna Callows and River Suck Callows. Note the overall consistent importance of the Little Brosna Callows. Data from Edge *et al*. (2020).

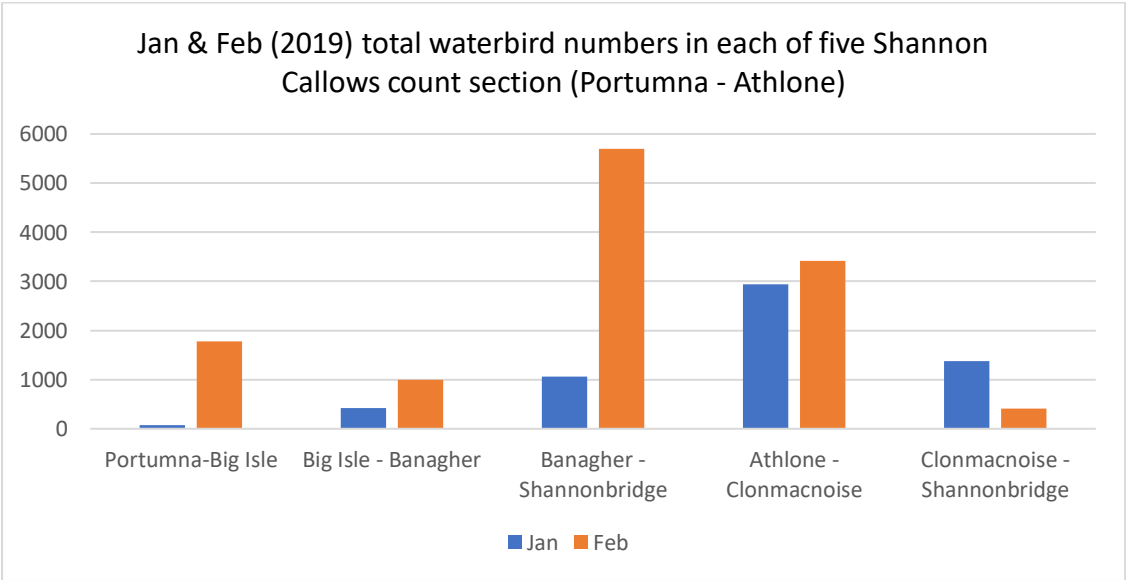


Figure 6. Summed waterbird counts on BWI/NPWS aerial surveys in winter 2018/19 in January and February in each of five subsections of the Shannon Callows. Note the relative importance of the sections to the north of Banagher (Banagher-Shannonbridge and Athlone to Clonmacnoise). Data from Edge *et al*. (2020).

The flock of Greenland White-fronted Geese *Anser albifrons flavirostris* in the Middle Shannon Callows/Little Brosna Callows is one of just a few, increasingly significant substantial flocks which occur in Ireland away from the SE Wexford Slobs stronghold. Numbers peak at around 200 birds currently and the trend is consistent with the long-term decline which has been documented (Fox *et al*., 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020). The flock has the largest feeding range in Ireland outside Wexford (Fox *et al*., 1994), utilising wet pasture, flood meadow and some marsh along the floodplains of the Little Brosna, the River Shannon, Upper Lough Derg and several neighbouring raised bogs and smaller rivers (NPWS unpublished). On the River Shannon, increased shooting disturbance between Shannonbridge and Banagher may have contributed to declining goose numbers on this stretch from the 1950's onwards and the current distribution of the Brosna/Shannon flock is in three main areas: (a) Little Brosna at Annagh and Gortskeha, (b) Bullock Island just upstream of Banagher on the River Shannon, and (c) Dags Callow/Slevoir Bay at Upper Lough Derg (NPWS unpublished).

Over the past thirty years Geese were often found around Shannon Harbour and on the callows just upriver of Banagher, as well as around the islands (Big Island, Friars Island) at Meelick where the Little Brosna enters the Shannon. Since the 1980's many sites along the River Shannon have only occasionally been used however, with the flock preferring the larger more intensively managed agricultural grassland feeding sites on the Little Brosna over those where traditional management continued or where agricultural abandonment occurred. Habitat changes to the islands (Big Island, Friars Island) in the 1960's reduced their suitability for geese, however, particularly Friar's Island (NPWS unpublished).

Greenland white-fronted geese are especially vulnerable to disturbance so their current absence (based on current and recent patterns of distribution) from the Shannon Callows section between Portumna and Banagher does not place major constraints on this proposal.

In this review we were unable to clarify the presence or otherwise of winter roosts of Hen Harrier *Circus cyaneus*. In the non-breeding season this significant species roosts communally often in reedbeds in or adjacent to heaths and bogs. Almost one-third of the 203 winter roosts documented by O'Donoghue (2021) have become inactive to due anthropogenic pressures. The location of roosts (via a data request through NPWS Birds Units) will be required to identify the presence or otherwise of winter roosts and avoidance would be essential in route planning.

2.2b Breeding season bird populations

Traditionally populations of three breeding species/species groups occurred in numbers of significance in the Shannon Callows. Corncrake *Crex crex* ceased to breed in the Shannon Callows around 2013 and the two remaining species are breeding waders (Lapwing *Vanellus vanellus*, Snipe *Gallinago gallinago*, Redshank *Tringa totanus* and Curlew *Numenius arquata*) and Whinchat (*Saxicola rubetra*). In 1987 the Callows held one of the three largest concentrations of breeding waders in lowland wet grassland sites in Britain and Ireland (Nairn *et al*. 1988) but between 1987 and 2002 numbers of all four species declined by between 68% and 83% (Tierney *et al.* 2002). Whist significantly less abundant than previously was the case, parts of the Callows, together with Lough Beg (Derry) and Lough Erne (Fermanagh) remain of outstanding national importance for breeding waders and of even higher relative conservation significance.

Breeding wader survey was supplied by BirdWatch Ireland for areas from Portumna – Meelick (Figure 7) and Meelick – Banagher (Figure 8). These show declines in sections 1-5 (Portumna – Ballymacegan) from 81 pairs (1987) to just six pairs in 2010. Then, as now, the sections Shannongrove and Esker/Banagher (#11 and #12; Table 5, Figure 8) are the most regionally significant, holding 191 breeding pairs of all species in 1987 and 84 in 2019 (Table 5). In these two subsites there is clearly a conservation imperative to avoid disturbance impacts. Figure 9 shows the key areas which have been monitored since 1987 in these two sections. The sites holding waders in and around Big Island and Friar's Island (section 6 Meelick) all lie to the Tipperary side of the Shannon and the most recent data (2017) shows Redshank and Curlew at the mouth of the Little Brosna. If required contemporary surveys of breeding waders using standard O'Brien & Smith (1992) methods should be undertaken.

The most recent surveys of breeding wader surveys were undertaken in 2019 (published in Edge *et al*. 2020) and six sites were surveyed between Portumna and Banagher. These figures are shown in Table 5, revealed relatively few breeding waders south of Big Isle (some bird at sites 1, 5 and 6). North of Big Isle the site at Shannongrove which includes Inishee Island is highly significant in a local, regional and national context, holding the only active Curlew territories in the Middle Shannon Callows and significant breeding populations of Redshank and Lapwing (Table 5).

Breeding waders are in decline throughout Ireland and, as a consequence, Lapwing, Curlew and Redshank are red-listed species on the *Birds of Conservation Concern* (Colhoun & Cummins 2013; Gilbert *et al*., in press). Historically numbers at most sites have shown large declines from surveys in

the 1987 (Nairn *et al.* 1988) and 2002 (Tierney *et al*. 2002; Table 5) with waders now absent from Portland Island and very low at all sites with the exception of Shannongrove.

Table 5. Results of 2019 breeding wader surveys in the Shannon Callows. Values refer to the number of breeding pairs recorded at each site. Data collected via the Shannon Callows Waterbirds project and as per Edge *et al*. (2020). Rows in bold occur in the area of the Shannon Callows between Portumna and Banagher. Totals in parentheses are total breeding pairs at each site in 1987 (Nairn *et al.* 1987) and 2002 (Tierney *et al.* (2002).

Site number	Site	Total	Curlew	Lapwing	Redshank	Snipe
1	**Portumna**	**6 (9,5)**	**0**	**0**	**0**	**6**
3	**Portland Island**	**0 (17,7)**	**0**	**0**	**0**	**0**
4	Long Island	0	0	0	0	0
5	**Ballymacegan**	**3 (21,7)**	**0**	**0**	**0**	**3**
6	**Meelick**	**4 (37,10)**	**0**	**0**	**1**	**3**
7	Little Brosna (Cloghan Castle)	9	0	1	5	3
9	Little Brosna (Inch Callows)	1	0	0	1	0
11	**Shannongrove (includes Inishee)**	**82 (91,46)**	**3**	**19**	**55**	**5**
12	**Esker / Banagher**	**2 (20,6)**	**0**	**1**	**0**	**1**
15	Lehinch	1	0	0	0	1
17	Bishop's Island	1	0	0	0	1
19	Long Island (Shannonbridge)	1	0	0	1	0
20	Devenish Island	6	0	2	3	1
21	Coolumber	0	0	0	0	0
22	Clonmacnoise	2	0	0	2	0
23	Curraghnaboll (Bunthulla)	16	0	7	8	1
24	Cloncraff (Inchinalee)	50	0	11	35	4
25	Long Island (Roscommon)	15	2	0	1	12
27	Golden Island	1	0	0	0	1
	Total	**200**	**5**	**41**	**112**	**42**

The meadows of the Shannon Callows are nationally important for breeding Whinchat, with > 50 breeding pairs found in recent years (Copland *et al.* 2012). Surveys in 2018 and 2019 as part of the Shannon Callows Waterbirds Project (Edge *et al*. 2020) identified a total of ca. 66 Whinchat territories. The stronghold remains north of Banagher and only one pair was recorded in the section considered here – on Big Isle and only in 2018.

<u>Figure 7.</u> Breeding Wader survey count units Portumna – Meelick/Big Isle, Shannon Callows, as used in successive breeding wader surveys 1987 onwards; information courtesy of BirdWatch Ireland.

<u>Figure 8.</u> Breeding Wader survey count units Portumna – Meelick/Big Isle, Shannon Callows, as used in successive breeding wader surveys 1987 onwards. The site marked with an orange star may have breeding Curlew present currently. The other 4 sites (marked with yellow stars) were historically important for breeding waders and as recently as 2017 held small numbers of breeding Redshank and Snipe. Information courtesy of BirdWatch Ireland.

<u>Figure 9.</u> Locations of key concentrations of breeding waders in Shannongrove and Esker/Banagher sections (see Table 5. All the marked areas currently hold important numbers of breeding waders and further site-specific information should be sought (and contemporary surveys done). Information courtesy of BirdWatch Ireland.

2.2c Threats and pressures

The current primary threats and pressures on the ornithological interests of the area are further agricultural improvement which, combined with the uncertainty causes by flooding, risks the retention of the area as a core breeding area for Whinchat and for lowland breeding waders. Avoiding agricultural abandonment or significant improvement would threaten the important extensive seasonally flooded semi-natural habitat which is so critical to Whinchat and breeding waders. Disturbance from recreation on or adjacent to the river has the potential to provide an additional negative effect but can be managed through sensitive spatial planning – taking route options which avoid the core important populations of wintering and breeding species, especially from Meelick to Banagher.

Some of the pressures are described below and were historically important (e.g. peat extraction) or may be future threats (e.g. windfarms on old peatland sites).

Pressure/Threat		Impact
Grazing	Abandonment of Pastoral Systems, Lack of Grazing	Medium
Agricultural improvement	Further drainage/improvement	Medium
Peat Extraction	Mechanical Removal of Peat	Medium
Renewable Abiotic Energy Use	Wind Energy production	Medium
Outdoor sports and leisure activities, recreational activities	Other Outdoor Sports and Leisure Activities	Medium
Other Human Intrusions and Disturbances	Death or Injury by Collision (eg overhead wires/windfarms)	Low

2.3 Consultation with local experts

The current status and distribution of birds was discussed with several local experts, especially in the context of possible constraints which may be significant in planning recreational routing. Little additional information arose from these consultations and the views primarily confirmed (a) that the area south of Big Isle (to Portumna) is relatively insignificant and does not hold especially important numbers of waterbirds, (b) that there has been a general decline in waterbirds over recent decades, (c) that the presence/absence of Hen Harrier roosts would need to be confirmed, (d) that the most important areas for waterbirds are around the confluence of the Brosna and Shannon and this area north to Banagher, and (e) the important areas for breeding waders (south of Banagher) are

especially sensitive, for example route planning would need to consider the potential for 'spillover' expansion of core populations if hydrological conditions permitted.

3. Sensitivity of birds to recreational, especially pedestrian disturbance

Disturbance can be considered discrete disruptive events which impact on bird populations, typically through altering access to food and/or space or affecting population or community structure. In addition to impacting behaviour, often negatively (e.g. displacement, reduced feeding time, additional energetic costs etc), these effects are often short-lived and may not have significant impacts. The response is seen as a trade-off between the risk of tolerating the disturbance and increased starvation risk from not feeding and avoiding (Stillman & Goss-Custard 2002).

At the more extreme scale, sustained and/or severe disturbance impacts can affect survival of individual birds, cause abandonment and effectively reduce the food and/or roosting functionality of a site. Anthropogenic disturbance is of increasing concern given the further encroachment of human populations on landscapes and the general and widespread pressures on biodiversity from a wide range of human impacts.

In general foraging behaviour of birds is negatively affected by the presence of humans and the severity of these disturbance effects are dependent, in part on a number of factors including (a) the number of persons present, (b) the nature of the activity, (c) spatial and temporal variables, and (d) inter-specific differences (Cruickshanks 2010). Species can become habituated to human activities and cease to react to human presence.

In this section we review the potential impacts of recreational activity on the principal SCI species in the area – wintering Whooper Swans, breeding and wintering waders, and Whinchat.

Some studies of the effects of disturbance of Whooper Swans have shown spatio-temporal effects (impacts on feeding activity varies within and between-years, with feeding site, with flock size and distance from tracks/roads). Distances that humans could approach before alerting the birds similarly varied with field characteristics (e.g. size and proximity to roads or tracks), and also with the type of disturbance involved. The distance at which >5% of the flock became alert because of human activity decreased with the number of previous disturbance incidents in the day, indicating that swans become less sensitive to disturbance events if daily disturbance frequency is high. There was no evidence that habituation to disturbance persisted over longer periods. The time taken for the birds to resume undisturbed behaviour varied with the duration of the disturbance event, which in turn depended on the type of disturbance involved, with pedestrians alerting the birds for longer

periods than vehicles and aircraft. Recovery rates following disturbance were also associated with field size, flock size and the proportion of the flock alerted. Feeding activity was influenced by a range of variables, including year, season, field location, crop type and the number of days that the flock had used the field (32.9% of variance in the data explained by these variables), with disturbance factors explaining an additional 4.9% of variance in the proportion feeding per hour. Conversely, alert activity was influenced mainly by disturbance events (Rees *et al*. 2005).

Relatively more research has been undertaken on the impacts of disturbance on waders, especially coastal waders. Some studies have reported avoidance of suitable habitat (Meager *et al*. 2012) which would expect to be reflected in birds being less abundant in the disturbed area. Studies have also shown behavioural (energetic) costs due to loss of foraging time (e.g. Yasue 2005, Goss-Custard *et al*. 2006) and even reduced survival (Gill 2007). A recent study of wintering Turnstones *Arenaria interpres* showed that they occured in higher densities and their populations decline less on, or close to, offshore refuges than on mainland sites subject to greater levels of human disturbance (Whittingham *et al.* 2020). There are a number of other studies examining human disturbance effects on wintering waders including Liley & Fearnley (2012; Poole Harbour, Dorset), Cruickshanks *et al*. (2010; Humber Estuary) and the Solent (Stillman *et al*. 2012).

Ground-nesting birds such as waders (Charadriidae) are regarded as being particularly susceptible to human disturbance during the breeding season. Disturbance of incubating birds might be expected to reduce clutch survival as eggs are exposed to increased risk of chilling or predation (Strauss & Dane 1989, Novic 1996, Liley 1999, Bolduc & Guillemette 2003), whilst the survival rates of precocial chicks may also be limited through reduced foraging opportunities and increased predation rates (Dowling & Weston 1999, Ruhlen *et al*. 2003). Ground-nesting birds often flush from nests when approached by humans (Nesbit 2000, Lord *et al*. 2001). Recreational disturbance might therefore be expected to reduce clutch survival as unattended eggs are exposed to chilling or predation. A study by Pearce-Higgins (2007) suggested that high levels of disturbance can impact upon habitat usage by upland waders, but only in limited circumstances where visitor pressure is very high (greater than at least 30 visitors per weekend day). However, access to such areas can be permitted for large numbers of visitors without impacting upon wader reproductive performance through the provision of a well-surfaced route. Holm & Laursen (2009) showed that breeding Black-tailed Godwits flushed and showed mobbing behaviour significantly more often when disturbed. The duration of simultaneous flights by breeding pairs was greater when disturbed, leaving nests susceptible to predation. Behavioural observations suggested birds were highly sensitive to human disturbance and unlikely to habituate. Disturbance levels of seven walkers/day affected territory densities up to 500

m from routes taken by walkers, causing effective habitat loss to breeding Black-tailed Godwits (Holm & Laursen 2009).

Yalden (1992) showed that common sandpipers *Actitis hypoleucos* breeding around a reservoir in the Peak District National Park were disturbed by anglers and other visitors, so that they take flight about 29% more than they would if undisturbed; they frequently were forced to encroach on their neighbours' territories, causing far more fighting than done by nearby riverine birds. They took flight from an approaching human at 27 m, but when guarding their chicks reacted ('alarm') at 75 m; anglers may stand as close as 25 m apart, emphasising the potential for disturbance. Disturbance from anglers is high at the start of the breeding season, and continued, though slackening, throughout, whereas casual disturbance from other visitors was very erratic. Along the north shore of the reservoir, common sandpipers avoid using the favoured angling beaches, whereas on the south shore they retreat into the conifer plantations. The consequence is a reduction in the size of the breeding population, but breeding success was unaffected.

We have noted that large numbers of Golden Plover and Lapwing occur in the Portumna – Meelick section but do so infrequently. There are several important factors that need to be considered in relation to assessment of impacts on these species of any development. These relate to (a) the species ecology and (b) quality/type of data considered. The two species tend to form large daytime roosts in dry or flooded grassland and mostly feed after dark. It seems likely that areas west of the river in this section may possibly be used by feeding/roosting birds, but the more extensive open callows habitat to the east (around the Brosna) are more likely to be utilised to the greatest extent. Impacts of recreational activity such as that considered here are likely to be mostly diurnal activities and thus have little/no impact on feeding site selection. It should be noted that the majority of Shannon Callows winter survey data arises from rather infrequent (not annual) aerial surveys. Golden Plover and Lapwing are especially susceptible to aircraft disturbance and will fly quickly in advance of survey aircraft. Therefore, the areas in which birds were counted may be rather different to the areas actually being used by the birds. To overcome these shortcomings, for this and other species, we would recommend detailed multi-year ground-based counts to determine more precisely the location of important roosts and feeding areas within the complex.

4. Review of case studies & opportunities for mitigation/management

There have been few studies of the impacts of greenways or similar pedestrian infrastructure on bird populations, in particular an apparent absence of studies with before-after-control-impact study design.

A detailed review of published evidence by Showler *et al.* (2009) indicated that evidence from quantitative studies (i.e. that subject to meta-analysis) for the impact of public access on breeding success was ambiguous (primarily due to small sample sizes). Qualitative/observational evidence derived from many other studies suggests that human disturbance through access on foot can be detrimental to the breeding success of most species of ground-nesting birds at all stages of the breeding cycle from territory establishment to fledging. A small number of mostly observational studies suggest that responses to a walker with a dog tended to be stronger than a person approaching without one; displacement of incubating or brooding birds led to increased predation risk from opportunistic predators, especially larger gulls *Larus spp*. and corvids *Corvus spp*. The level of impact was highly variable between species and dependent upon locality and the disturbances involved. As such, proposed restrictions on access must take into account sensitivity and vulnerability to disturbance on a species-by-species basis, and site characteristics. In the non-breeding season there is also good evidence that dogs off lead cause significant disturbance (Banks & Bryant 2007) and this aspect of pedestrian activities and recreation is almost certainly the most potentially damaging. In winter coastal situations, for example, dog walkers with the dogs off leads accounted for 40% of the birds observed flushed, while walkers accounted for 17% and canoeists 15% in the Poole Harbour study (Liley & Fearnley 2012).

There is some evidence that signage and access restrictions are effective to reduce disturbance at nesting sites. Dowling & Weston (1999), found that hooded plovers *Thinornis rubricollis* had significantly higher reproductive success in 1991-8 under three restricted-access regimes, compared to two regimes that allowed dogs on the beach (0.55 fledglings/clutch for 40 restricted access clutches vs. 0.10 fledglings/clutch for 131 open-access clutches). Hatching success was 31-40% and fledging success 31-68% for the 40 clutches in areas with no access for dogs; both dogs and people or under a 'Plover Watch' scheme, where volunteers ask people to avoid nests and control dogs. This compared with hatching and fledging success of 0-12% and 0-16% for 131 clutches in areas where dogs were prohibited from 0900–1700 each day or where there was unrestricted access to people and dogs. Overall, the average number of fledglings increased over the study period.
A study at three sandy beaches in the Algarve, Portugal (Medeiros *et al.* 2007), found that little tern *Sterna albifrons* breeding success in 2003-5 was significantly higher on two beaches with information and warning signs and weekend wardening, compared to a beach without protective

measures (50-91% nesting success for 339 nests on the two protected beaches vs. 0-35% success for 153 nests on the unprotected beach). The presence/absence of protective measures was the most important predictor of nesting success. The main causes of nest failure were predation, destruction by humans and dogs and abandonment. A small before-and-after study on a beach in California, USA (Lafferty *et al.* 2006), found that the number of breeding snowy plovers *Charadrius alexandrinus* increased from one pair in 2001 to 26 pairs (fledging 74 young) in 2004, following the installation of a simple rope fence in June 2001. The probability of eggs being trampled in 2002 was 8% outside the roped area, compared with 0% inside. The fence consisted of metal posts every 5 m and a single rope strung across the top. In 2001, 265 m of beach was roped off; this increased to 400 m in 2002 and further increased in 2003-4.

In wintering birds, a study by Burger *et al.* (2004) found that disturbance to shorebirds decreased markedly following intensive management intervention to control birdwatchers and crab collectors. Both the mean disruption rate and the mean time that shorebirds were disturbed increased during the 1980s when there were no restrictions or viewing platforms and then declined by 2002 after viewing platforms were constructed and beach access restrictions were enforced (5.6 disruptions/hour and 53 minutes disturbed/hour in 1987 vs. 0.4 and 3.6 in 2002). Fewer people were observed on the beaches after restrictions were enforced and only one bird watcher disturbed the birds in 2002. However, the percentage of disturbed shorebirds that flew away (and did not return within 10 min) did not change during the 1980s and increased in 2002. Observations were made on 12–20 days each year for 6–10 h per day.

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GALWAY TO ATHLONE CYCLEWAY

Option Selection Report

Volume F – Environmental Appendices

Appendix F2 – Archaeological, Architectural and Cultural Heritage

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Galway to Athlone Cycleway

F01

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Plate 36: *Athenry Heritage Centre (former church) (CH0476 & CH0483). Medieval church with its tracery windows in the foreground and Victorian church in the background*

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Plate 39: *Athenry Castle (CH0472), facing northeast*

Plate 40*: Athenry Castle (Source: The Stereo Paris Photographic Collection 1860-1883 - https://www.nli.ie/digital-photographs.aspx)*

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Plate 53: *St John the Evangelist Church of Ireland church (CH8587), Ballinasloe*

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Plate 55: *Presbyterian Church (CH8593), Ballinasloe*

Plate 56: *Le Poer Trench Memorial, (CH4705) Ballinasloe*

Plate 57: *Garbally House (Colláiste Sheosamh Naofa) (CH5093), a Country House built in 1819 and converted to a secondary school in 1922*

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Plate 66: *Oranmore Castle (CH7599), facing west*

1 INTRODUCTION

This report outlines the comparative assessment of options in relation to archaeological, architectural, and cultural heritage for 5 no. route corridor options for the Galway to Athlone Cycleway Scheme. This assessment will form part of a Phase 2 – Option Selection Report. See Volume A, Option Selection Report for a description of the project. This report is best read with the accompanying drawings located in **Volume D4** and the photographic record in **Appendix 1**.

1.1 Methodology

This report entailed both a desk-based study of the proposed routes and a field survey of the most significant cultural heritage features and landscapes covered by each route (see Inventory in **Appendix 2**). The following sources were used:

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for counties Galway, Roscommon, Westmeath, and Offaly as published by the Archaeological Survey of Ireland (SMR dataset exports from Historic Environment Viewer[1] and a review of published (1995/1996) RMP inventories).
- *Archaeological Inventory of County Galway (Vol. 1 & 2).*
- Record of Protected Structures (RPS) for County Galway, County Roscommon County Westmeath, and County Offaly per relevant current County Development Plans: *Galway County Development Plan 2015-2021, Roscommon County Development Plan 2014-2020*, *Draft Westmeath County Development Plan 2021-2027*, and the *Offaly County Development Plan 2021-2027.*
- National Inventory of Architectural Heritage (NIAH) Buildings Survey for Counties Galway, Roscommon, Westmeath, and Offaly per dataset downloads from Historic Environment Viewer[2].
- Various published and unpublished sources (see reference section).

The constraints within the study area were compiled into a master inventory and were assigned a unique Cultural Heritage number (CH). The reason for this was to simplify the archaeological sites, monuments and historic buildings that have multiple designations *i.e.,* listed within different records, such as the Sites and Monuments Record (SMR), National Inventory of Architectural Heritage (NIAH) and Record of Protected Structures (RPS). Thus, multiple designated sites were given one single CH number.

Using this master inventory produced for the Constraints Study, the constraints were filtered per route using QGIS vector selection algorithm. In order to do so, each route layout was converted to a single polygon vector layer. For each 'Public Route layer' (provided as a vector polyline) a 100m buffer zone (200m corridor) polygon vector was generated *via* QGIS vector geoprocessing tools. The 'Public Corridors' layer, provided as a pattern of polylines, was redesigned into a polygon vector. The 'Consultation Areas' were provided as polygon vector layers. All three polygon vectors were merged into a single layer per route, using QGIS data management tool. Having all routes as a single polygon layer, the constraints from the Cultural Heritage inventory was extracted. Ultimately, these constraints were exported as a CSV table (comma-separated values) per route.

The field survey was carried out by a qualified and experienced archaeologist in August 2021 and January 2022. The sites chosen for field survey were based on the National Monuments and Multi-designation sites (MDS) identified during the Constraints Study, as well as important landscapes and other cultural features within the route corridors. Overall, the sites surveyed, were chosen on the basis that they provide a mix of urban and rural sites and landscapes, cover the main periods of settlement evident within the route corridors and accentuate some of the best examples of cultural heritage features of Galway's historic environment.

[1] Available at: https://webgis.archaeology.ie/historicenvironment/

[2] See Ref. 2 above

2 EXISTING ENVIRONMENT

2.1 Route option 1

Route 1 begins in Athlone on the western bank of the River Shannon.

2.1.1 Athlone

The town of Athlone is strategically located at a natural fording point on the River Shannon - an important transport route throughout history. Located on the frontier between the kingdoms of Connaught and Meath it has a long history of conflict. A battle was fought at Athlone AD 894 between the men of Connaught and Westmeath (M894.13). The Annals of Ulster describes how a causeway was built across the river in AD1001 (U1001.6).

The first bridge and castle at the location of Athlone were built by Toirdealbach, King of Connacht, in 1120 and 1129 respectively (M1120.7). The foundation of a Cluniac priory dedicated to St Peter and St Paul at Athlone also indicate a relatively substantial settlement by the twelfth century. The Anglo-Normans fortified the western bank of the ford with a motte which was burnt in 1199 (Graham 1988, 22). The town later became a centre of English administration in Ireland and in *circa* 1210 John de Gray built a stone castle there which still stands as the central keep within Athlone Castle (CH9097) (**Plate 8**) (Langrishe 1890, 278; Hayward 1989, 111).

Although the town centre of Athlone is on the east side of the River Shannon, outside of the study areas associated with the Route Selection, it is worth mentioning that within the modern-looking town centre there are a number of features of architectural heritage merit. These include St Mary's Church of Ireland church, built on the site of a sixteenth-century church. Many of the buildings along Dublin Gate Street and Church Street retain an eighteenth-century and nineteenth-century character and elements of built fabric. At Custume Place on the approach to the Shannon Road Bridge is a memorial statute to the Irish War of Independence and Irish Civil War. On the western bank of the River Shannon at Athlone, adjacent to Shannon Road Bridge is the Luan Gallery (CH9025), housed in a former temperance hall, built in 1897 and located beside St Peter and St Paul's Church (CH9026) (**Plate 9**). The Luan Gallery is a municipal visual arts gallery with free admission. Directly opposite on Custume Place is Athlone Castle, which is accessible to the public via its visitor centre.

A canal was constructed on the west side of the Shannon in 1750. The introduction of steamboats in the 1830s led to the improvement and investment in the navigation of the river under the auspices of the Shannon Commissioners who oversaw the dredging of the river and the construction of quays, a dam, and a lock. The sixteenth-century bridge was replaced by the Shannon Road Bridge (CH9024) – a four-arch Italianate-style road-over-river bridge - between 1841 and 1844 (**Plate 4**). The success of the Shannon navigation was eclipsed by the Midland Great Western railway in 1851 and the Great Southern and Western railway in 1859, which boosted economic growth in the town. Athlone's location near the centre of Ireland means that it is ideally positioned to act as a hub for travel north and south via the River Shannon and east and west via the railway and road network. The transport infrastructure in the form of the Shannon Navigation (*e.g.,* the lock keeper's house (CH9093) (**Plate 7**) and associated infrastructure) and the Victorian Shannon Railway Bridge and associated features (CH9120 & CH9123) (**Plates 1** – **3**) are important and interesting features of the built environment of the western portion of Athlone. A history of fortification, which began with the erection of Athlone Castle, continued through the eighteenth and nineteenth centuries with the construction of barracks and batteries (including No 2-7 Batteries Athlone (CH9108)) on the western side of the river.

From the western bank of the River Shannon, Route 1 (Consultation Area) traverses an area of grazing land of long, coaxial rectangular fields, bounded in the main by hedges and hedge-lined banks and drainage ditches orientated on a general northeast to southwest and northwest to southeast trend. These boundaries were established by the early nineteenth century as evidenced by their depiction on the first edition Ordnance Survey (OS) map of *circa* 1830. These narrow strips of land are possibly also captured in the placename Keeloges just west of the R446 Road.

Moving southward the route crosses Garrynagowna Bog and Carricknaghtan Bog, a flat expanse of generally unenclosed bog traversed by a series of twentieth-century rectilinear roads (some grassed over and seldom used) that were likely constructed to facilitate the exploitation of turbary rights (**Figure 1**).

***Figure 1**: Aerial view of Garrynagowna Bog and Carricknaghtan Bog showing Route Option 1 (pink wash)*

Moving southwestwards the route (Public Route) mirrors the direction of travel of the Shannon. It passes through areas of industrial peat extraction that are traversed by modern industrial railway lines, interspersed with areas of grazing. The land is generally enclosed into small sub-square and sub-rectangular fields to the south and southwest of the village of Carnafulla. This part of County Roscommon is not densely populated with recorded archaeological sites (SMR/RMP), however clusters of peatland sites including structures, togher and platforms have been uncovered during peat extraction, such as those in the townland of Cornafulla. This peatland archaeology, although important has no surface expression and has no amenity value. The ecclesiastical site of Clonmacnoise is located on the opposite side of the Shannon in County Offaly. Although this site is outside the study areas, it is one of the most popular visitor attractions in the region, receiving up to 170,000 visitors per year (Irish Times 2019).

The route (Public Route) travels in a south-southwest direction along an abandoned industrial railway line that crosses the R357 road before crossing the River Suck via a twentieth-century Bord na Móna industrial railway bridge into East County Galway just west of Shannonbridge. Bord na Móna began industrial peat milling in the midlands of Ireland in the 1950s. Evidence of industrial peat harvesting, which provided material for power generation, horticulture and domestic fuel, is visible throughout the landscape in the form of narrow-gauge railway lines.

Upon crossing the Suck, the route turns westward, travelling along a towpath on the former Grand Canal (CH0350 (Ballinasloe Canal)) (**Figure 2**). Although the canal is no longer extant, it was an important feature of the industrial heritage of East County Galway. The route passes through further areas of industrial peat extraction along the southern portion of the River Suck, where peatland archaeology has been uncovered (again with no surface expression or amenity value), towards the southern outskirts of Ballinasloe. This area of peatland is interspersed with areas of grazing land, enclosed into small sub-rectangular and sub-square fields bounded by hedges and bank-lined drains. Much of the enclosure of this landscape pre-dates the middle of the nineteenth century as evidenced by the first edition OS maps for this area.

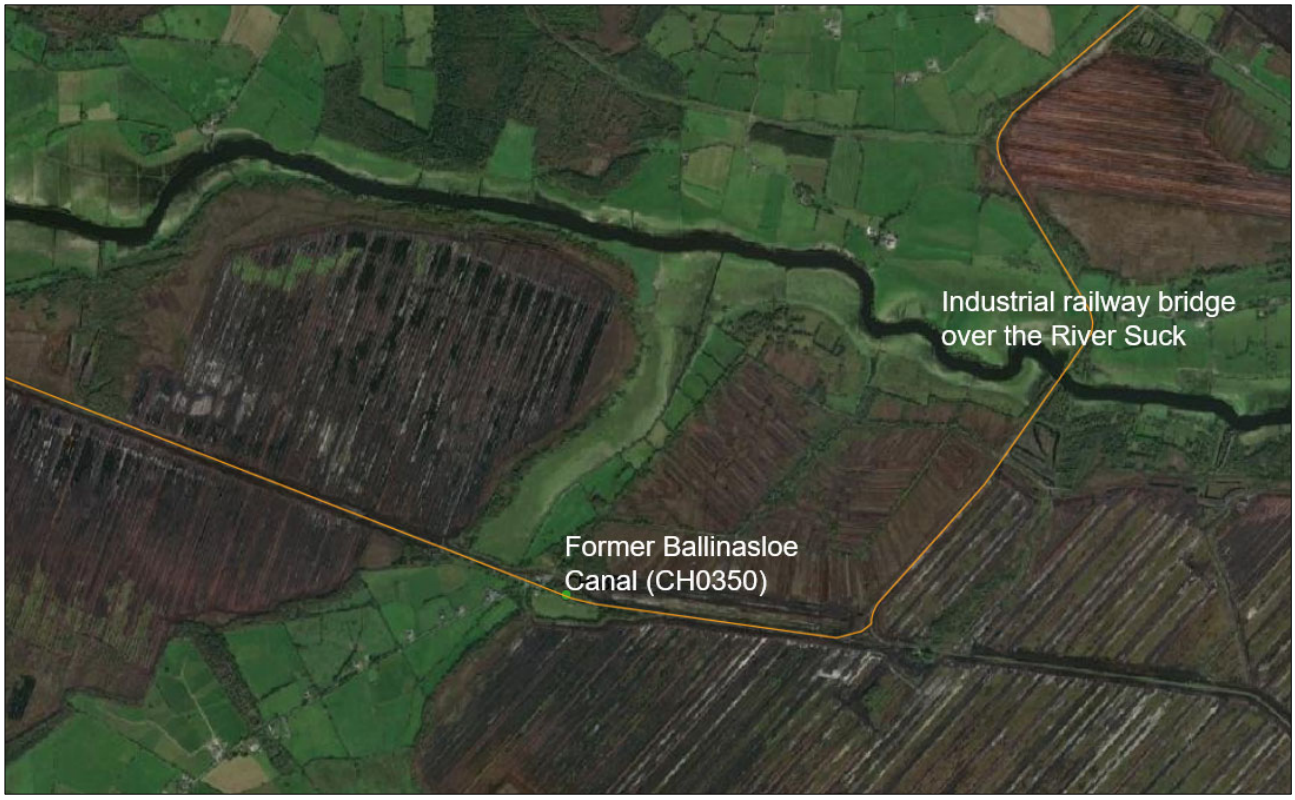

***Figure 2**: Aerial view showing the Public Route traversing the River Suck via an industrial railway bridge and along the former Ballinasloe Canal*

2.1.2 Ballinasloe

The market town of Ballinasloe is located at a strategic fording point of the River Suck on the historic route between Galway and Dublin. The River Suck is a tributary of the Shannon and defines the boundary between Counties Galway and Roscommon. Its geographical location is reflected in the placename of Ballinasloe which is an anglicised version of *Béal Átha na Sluaighe* meaning 'the ford mouth of the hostings'. A routeway known as ***an tSlí Mhór***, one of five early medieval 'highways' on the island of Ireland leading to the royal site at Tara, is believed to have passed this ford.

The Annals of the Four Masters (AFM) record how Toirdhealbhach O'Connor, King of Connacht, constructed a castle known as *Dun-Leodhar* at Ballinasloe in 1124 (AFM1124.15). The remains of earthworks at the location of a chapel built on the site of *'Dún Leodha'* in Ballinasloe are visible on the Ordnance Survey map of 1837. In 1235 an Anglo-Norman castle and manor named '*Suicin'* was constructed on the eastern bank of the river. The Norman manor was replaced in the fourteenth century by a castle constructed by Tadgh O' Kelly, chieftain of the *Uí Mháine*. The O'Kelly castle was subsequently taken over by the English crown in 1579 and used by Sir Anthony Brabazon. The castle has since been destroyed but an associated rectangular bawn and turret can still be seen at the site. A stone bridge was constructed across the river in 1579 on the order of Sir Henry Sidney, the Lord Deputy of Ireland. The impressive mid eighteenth-century stone bridge, which spans the river today may contain fabric from the Elizabethan bridge. In the seventeenth century, after the 1641 rebellion, the Brabazon estates were forfeited and the lands at Ballinasloe passed into the ownership of the Huguenot Trench family.

The Trenches, later created Earls of Clancarty, gradually built a model town on the western bank of the river defined by a regular street pattern and burgage plots laid out around a wide market square. Ballinasloe developed into an important regional market town during the nineteenth century in part due to an improved transport network following the completion of the Grand Canal in 1828 and the arrival of the railway in 1851.

Ballinasloe contains several features of architectural heritage and attractive late eighteenth-century and nineteenth-century streetscapes, within the Ballinasloe Architectural Conservation Area (ACA), including along Main Street and Dunlo Street. Principal structures in the town include a collection of churches of various denominations, including St Michael's Church (CH8586), St John the Evangelist Church of Ireland

(CH8587), Presbyterian Church (CH8593) and Sisters of Mercy Convent Chapel (CH0365) (**Plates 53-55**). Other buildings including the railway station, courthouse and Town Hall make a noteworthy contribution to the built heritage of the town also. A statue on St Michael's Square is dedicated to the annual *Ballinasloe Horse Fair*, which is held annually on the Fair Green and is one of Europe's oldest and largest horse fairs, attracting up to 80,000 visitors each October.

Another interesting cultural heritage feature in Ballinasloe is the Le Poer Trench Memorial (CH4705) (**Plate 56**). This feature, set on a hill on the R446 (Old Dublin Road) opposite the Fair Green is an eye-catching limestone monument, which contributes to the built heritage of the town.

Also, within the vicinity of Ballinasloe, is Garbally Demesne (CH5093) located to the southwest of the town. The Country House (now a secondary school) was built in 1819 (**Plates 57** & **58**). According to the NIAH:

> '*The house was designed for the second Earl of Clancarty by English architect Thomas Cundy in 1819 and built in place of an earlier house that had burnt down in 1798*'.

On the first edition OS map Garbally House is depicted as a large quadrangular pile to the northeast of the ruins of an earlier castle, within an expansive demesne landscape of parklands and forestry intersected by an almost dendritic pattern of paths and roads. Clear views in an easterly direction from the front façade (east elevation) of the house, through formally arranged gardens are provided by a clearing in the woodland and what appears to be a ha-ha depicted on the 25-inch OS map (*circa* 1900). A pleasure landscape with parterres and a fishpond are located to the north of the main house. Although some of the demesne features remain, including areas of woodland with formal walks, a portion of the land has reverted back to agriculture and modern buildings associated with the school have been constructed to the south of the house. Additionally, modern development associated with the expansion of the town of Ballinasloe along the R446 Road has encroached on the demesne landscape to the northeast of the house.

From Ballinasloe the route splits with one heading north and one heading northwest and these converge again at Mountbellew.

2.1.3 Northwestern route

Moving in a north-westerly direction, this route skirts the western side of the Bunowen River through areas of pastureland towards the village of Ahascragh. This landscape contains a moderate number of recorded archaeological and other cultural heritage sites, including Lawville House (CH7064), Ahascragh Bridge (CH0133) crossing the Bunowen River, Milverton House (CH0130) (**Plate 47**) and Ahascragh Mills (CH0125) to the west of the village.

2.1.3.1 Ahascragh

The village of Ahascragh is believed to have developed from an Early Christian ecclesiastical site associated with St Cuan, a local saint whose death is recorded in the Annals of the Four Masters in AD788 (M788.10). A holy well dedicated to the saint is located near the village and the location of a possible pre-Norman church is also marked on the first edition map at the centre of the village. The Annals record a battle at Ahascragh in 1307 between the O'Kelly clan and the English forces:

> ***'****The greater number of the English of Roscommon were slain by Donough Muimhneach O'Kelly, Lord of Hy-Many, at Ath-easgrach-Cuan, where Philip Muinder, John Muinder, and Main Drew, with many others whose names are not mentioned, were killed. Dermot Gall Mac Dermot, Cormac Mac Kaherny, and the sheriff of Roscommon, were taken prisoners; but they were afterwards set at liberty, and they made peace recte restitution for the burning of the town by Edmund Butler. Donough O'Kelly, after he had performed these exploits, died; and his was not the death of one who had lived a life of cowardice, but the death of a man who had displayed prowess and bravery, and bestowed jewels and riches (M1307.4).****'***

A six-arch stone bridge, built *circa* 1780 carries a road over the Ahascragh River to the south of the village. St Cuan's Church (CH0128), a gothic revival church constructed *circa* 1800 also occupies a prominent position in the village (**Plate 46**). A corn mill complex powered by water from the Ahascragh River opened in 1810 and the village became an important centre for milling in the local area. St Catherine's Church (CH0127) was erected in 1814 on the eastern outskirts of the village. Samuel Lewis' *Topographical Dictionary of Ireland* described Ahascragh in 1837 as a post town with around 120 houses and 851 inhabitants.

From Ahascragh the route skirts the Bunowen River, moving in a northerly direction through areas of moderate and unimproved pasture, generally enclosed into rectangular strips bounded by field banks and hedges. Following the river, the route (Public Route) travels along existing paths through forestry plantations (some of which is also depicted on the first edition Ordnance Survey map of *circa* 1830) near the northern extremity of Clonbrock Demesne to the south of the R358 Road. Clonbrock House (NIAH Reg. no. 30406012), a Country House built *circa* 1790 and in a ruinous condition is located to the south and is screened from view along the Public Route by mature hedges and forestry plantations.

2.1.3.2 Caltra

Early medieval settlement in this area is evidenced by the existence of a number of ringforts throughout this landscape, including CH2377 (unclassified ringfort GA060-025----). The village of Caltra appears to have its origins in the fourteenth century when a religious house of the Carmelite Friars was erected here in 1320 (CH2382) and later an associated Nunnery (CH2378) to the east. The site of the former Carmelite Friary is now occupied by mid nineteenth-century church dedicated to St Solan (CH2382) and its associated graveyard.

2.1.3.3 Castleblakeney

Castleblakeney, a neighbouring village to the west of Caltra may also have its origins in the medieval period as evidenced by the existence of an early ecclesiastical site (CH3067) to the south of the village.

The Church of Ireland church, which is on the site of the ecclesiastical site (CH3067) was built in the Board of First Fruits style in *circa* 1810. This single-cell church has a three-bay nave, three-stage bell tower at the west end, and lean-to vestry to the east gable (www.buildingsofireland, 2009). It is now home to the *Castleblakeney Heritage Centre and Library*. The village, though unremarkable contains a small collection of street furniture, including a moulded concrete telephone box (erected *circa* 1950), religious shrine and cast-iron water pump.

The landscape to the north of Castleblakeney is similar to what preceded along the route to the south, in terms of landcover and archaeological monuments, although the number of archaeological sites appears to increase somewhat approaching Mountbellew.

2.1.4 Northern route

From Ballinasloe the northern route skirts the western side of the River Suck. This area consists of mixed farmland with patches of arable scattered through the pastureland. Fields are slightly larger than in preceding areas to the south, laid out in a sub-rectangular pattern, bounded by a mixture of hedges, field banks and post-and-wire fences with occasional drystone walls. The route passes through expanses of open bogland such as Annaghbeg Bog.

Moving northward the route passes through the commercial peat extraction site at Addergoole North. A cluster of peatland archaeological sites, including toghers and platforms have been identified during peat extraction (none of these have surface expression or amenity value, though it is important to note the propensity for the discovery of these types of features in this landscape) to the west where the route leaves the bogland and meets an existing track (former industrial railway line) at Knockaunrore. This industrial railway line cuts through the former demesne landscape associated with Daly's Grove, though the extant demesne buildings are generally screened from view by vegetation and trees that line the trackway. The route follows the alignment of the industrial railway, skirting the eastern and northern edge of further commercial peat extraction sites. Several peatland archaeological sites have been uncovered during peat extraction in the townland of Srahloughra, Acre East, Cloonshee and Kiladerry (again with no surface expression or amenity value).

The route continues in a north-westerly direction to its convergence with the L3210 Road, where it turns westward along the road (**Figure 3**). The general landscape is one of small, narrow rectangular fields and areas of open bogland.

The extensive demesne landscape associated with Mountbellew House (CH7356), including woodland and parklands are extant to the south of the village of Mountbellew (**Plate 32**). St Mary's Church (CH7357) (**Plate 33**) is built on the site of an earlier church recorded in the SMR/RMP.

***Figure 3**: Aerial view showing the Public Route (orange line) and Consultation Area (pink wash) lining the L3210 Road*

2.1.5 Mountbellew

Mountbellew, an estate village located on the road from Galway to Roscommon, was founded by the Grattan-Bellew family who resided at Mountbellew House to the south of the village. The Bellew family, originally of Williamstown, County Louth, were granted lands in the parish of Moylough, baronies of Tiaquin and Killian, under the Acts of Settlement, patents dated 26 November 1677 and 21 March 1678, and built a large house at Mountbellew. The Bellews who remained Catholic owned large amounts of land in the area. They also invested in various enterprises such as flour mills which added to their wealth. By the 1870s the family owned over 10,000 acres in county Galway. The family continued to develop the estate and town extensively during the nineteenth century, including the construction in *circa* 1810 of a five-arch stone bridge (CH0449) which carries the main road across the Castlegar River at the centre of the village. In 1904 an agricultural college was established in the village by the Franciscan Brothers and the Bellew family. In 1937 the Bellew Estate was taken over by the Land Commission and Bellew House was demolished two years later to provide stones for roads. A statue commemorating the horse Bobbyjo, who won the Grand National in 1999 is an interesting feature of modern street furniture and statuary within the Town Square.

Moving southwest the landscape between Mountbellew and Menlough is one of good quality flat farmland, with fields enclosed in a regular pattern of square and rectangular shapes, bounded by hedges, banks and drystone walls. Southwest of Menlough the land disimproves in quality, reverting to bogland and unimproved pasture. There are few recorded archaeological or other cultural heritage sites in the area immediately surrounding the route.

The route travels along existing trackways through Monivea Demesne, with Monivea Castle screened from view by woodland from much of the route. The route follows one of a maze of trackways and pleasure walks associated with the demesne, passing close to the Ffrench Mausoleum (CH7314) (**Plate 34**). It then travels along the avenue to the village of Monivea, passing Monivea Church of Ireland church (CH5252) (**Plate 35**), which is built on the site of an earlier ecclesiastical site.

The route joins the former Tuam to Athenry railway line just north of Bellville Demesne. It follows the railway line southward through a landscape of good agricultural land with sparse numbers of recorded archaeology or cultural heritage nearby, although the line passes under two mid nineteenth-century bridges associated

with the Athenry to Claremorris railway line recorded in the NIAH (CH2515 & CH1005), before arriving at Athenry.

2.1.6 Athenry

The name of the town is from the Irish Baile Átha ‘n Rí, thus indicating that the ford there must have been of importance in pre-Norman times. As no kings of any note are known to have associated to the area at any time, the name should perhaps be translated as ‘River Ford’ rather than as ‘Kings Ford’, rige being an ancient Indo-European word associated with rivers. The Clarin River in Athenry, gives its name to Clarinbridge where it enters the sea.

Athenry contains a cluster of important medieval cultural heritage sites (**Plates 36-42**), including three National Monuments: an Anglo-Norman castle (CH0472) (**Plates 39-40**) built shortly before 1240, Dominican Priory (CH0475) (**Plate 38**); a market cross (CH0476) (**Plate 37**) erected circa 1475 and the North Gate (CH0474 part of the town defences) (**Plate 45**). This walled town is exceptional in an Irish context, as it retains not alone so many medieval features but also architectural heritage from the post-medieval and early modern periods also. The Athenry Architectural Conservation Area (ACA) covers much of the urban area within the town walls. The former Church of Ireland church, built *circa* 1828 and now a heritage centre was built on the site of an earlier church (CH0476 & CH0483) (**Plate 36**). According to the NIAH (https://www.buildingsofireland.ie/) the earlier church was founded about 1240 and was destroyed in 1574 by the Earl of Clanricarde’s sons. There is a grouping of sites of architectural merit dating to the eighteenth and nineteenth centuries recorded along Clarke St and around the Market Square area. Athenry House (CH0541), built circa 1780 to the south of the town centre is in a derelict condition and screened from view by modern structures. Athenry contains a group of architectural heritage sites associated with Athenry Railway Station (CH1888 CH1889 CH1890 CH1892) to the northwest of the town centre (**Plates 43-44**). These nineteenth-century structures are important features of railway heritage in County Galway.

From Athenry the route crosses to the southern side of the M6, then crosses to west of the M18 in a westerly direction towards Oranmore. The interstice between the M6 and the Galway to Athenry railway line contains few archaeological sites, though their numbers increase slightly approaching Oranmore.

2.1.7 Oranmore

The town of Oranmore is located on Galway Bay. The Ordnance Survey Letters detail how the placename of Oranmore is mentioned in the Annals of the Four Masters of AD1597 (AFM1597.1). The name in Irish Órán Mór is possibly derived from *Uarán Mór*, meaning the ‘large cold spring’ (https://www.logainm.ie/en/18476). During the medieval period the Norman family of de Burgo (later Clanricardes) built a stronghold here in the form of a large rectangular tower house at the edge of the sea, possibly on the site of an earlier castle. The castle played an important role in the defence of Galway during the Confederate Rebellion in the 1640s when provisions were shipped from the garrisoned castle to the besieged fort of Galway. In 1642 the town of Oranmore joined in the rebellion and after the surrender of the Governor of Galway, Captain Willoughby, in 1643 the castle was temporarily lost. Richard Burke, 6th Earl Clanricarde, regained his fathers forfeited possessions and in 1666 the castle was leased to Walter Athy. Athy and his descendants remained in control of Oranmore until 1853 when the castle was abandoned. Oranmore Castle (CH7599) (**Plate 66**) is visible from Castle Road and the adjacent late eighteenth-century Castle Pier (CH1623). Although Oranmore has expanded greatly in the past few decades, parts of the historic core of the village are evident in some late eighteenth-century/ early nineteenth-century buildings on the Main Street such as Oranmore Library (CH608) (**Plate 65**), formerly a church and McDonagh’s thatched public house (CH1625). The Joseph Howley monument (CH1626) is an interesting and important piece of twentieth-century street furniture and a prominent landmark in Oranmore commemorating a local hero of the War of Independence.

From Oranmore the route stays close to the coastal margin to the north of Oranmore Bay, centred on the N67 toward the southern outskirts of Galway at Merlin Park Woods, where a tower house (CH7172) is currently being refurbished.

2.2 Route option 2

Like Route 1, Route 2 begins in Athlone on the western bank of the River Shannon and shares a similar landscape to Route 1 at this location. Athlone’s position on the River Shannon close to the centre of Ireland has meant that it is a hub for transport east to west and north to south via the railway line from Galway to Dublin and the river. As such, Athlone has a very strong railway and riverine heritage (**Plates 1-7**), as well as

military heritage (**Plate 8**) and this is borne out by the number of associated cultural heritage sites recorded in the town.

The route travels in a southwest direction from the west of the Shannon close to the Shannon Railway Bridge (NIAH15004129). The route skirts the southern side of the railway line from the Shannon partly along the existing Carberry Road/Old Galway Road in a south-westerly direction. West of Athlone the suburban area turns to agricultural land of long, narrow fields bounded by coaxial field drains, orientated in a general northwest to southeast trend. Some of these fields are bisected by the railway line and pre-date the first edition Ordnance Survey (OS). There are few recorded archaeological sites is area, between Hall's Bridge and the Cross River either side of the railway line.

West of the Cross River, the agricultural quality of the land improves slightly, with sub-square fields apparent. From the junction of Old Galway Road and the R446 the proposed route lines both the north and south sides of the railway line.

Passing through Ballinasloe the proposed route traverses an area containing the railway heritage sites associated with Ballinasloe Station and railway line and features associated with Garbally Demesne, some of which are listed on the Record the Protected Structures (RPS) for County Galway. Cultural heritage sites around Ballinasloe are described in Route 1 above (also refer to **Appendix 2**).

Heading west from Ballinasloe the railway line traverses a landscape containing forestry plantations to the north and improved pasture enclosed into square-shaped fields by hedges and drystone walls. Townland names such as Lissard and Dundoogan attest to the early medieval character of the archaeology in this area.

Approximately 1km south of the proposed route is the village of Kilconnell and the early ecclesiastical sites that give the village and the barony its name (**Plates 25-26**). According to Grose (1791, 65), an abbey (CH0019) was founded at Kilconnell in the fifth century by St Conal and that William O'Kelly erected a Franciscan Friary here in 1400. This site is visible from the public road and as the abbey stands in a public burial ground, the ruins may be visited at any time.

Biggar (1901, 145) stated "Kilconnell is perhaps the most perfect of the Franciscan houses at present remaining to us in Ireland, and was in use later than most others, being occupied and in a good repair in the time of James 1".

On the approach to Woodlawn Railway Station (CH2798, etc.) (**Plate 61**) (recorded in the RPS) and for a few kilometres west of it the landscape contains areas of bogland and forestry plantations, interspersed with some areas of improved pasture. The main exception to this is the demesne landscape associated with Woodlawn House (**Plates 62-63**) to the southwest of Woodlawn Railway Station. Woodlawn House (CH8796), a Palladian-style country house with its associated icehouse (CH8798) and gatelodge (CH8806) are some of the most significant cultural heritage features in this area. Much of the Woodlawn Estate is closed to the public, although the 'Golden Mile', a walking trail around some of the landmarks within the estate is accessible. Most of the cultural heritage sites as far west as Attymon Railway Station (CH0600) that are located in close proximity to the proposed route are associated with the railway infrastructure and recorded on both the NIAH and RPS (including bridge CH0601, **Plate 64**). North and south of Attymon, the recorded cultural heritage sites mainly consist of peatland archaeology, identified during peat cutting (none of which have surface expression or amenity value).

Approaching Athenry the land improves with larger fields of pasture and arable apparent. The railway line passes through the southern extremity of Graigabbey Demesne. The country house (CH5447), built *circa* 1800 is extant, although much of the demesne landscape has not been maintained. Tree plantations between the railway line and the house screen direct intervisibility. From Athenry to Galway the route follows a similar path as Route 1.

2.3 Route option 3

The portion of Route 3 between Athlone and Ballinasloe follows the same alignment as Route 1. From Ballinasloe the route corridor takes in a wide area to the south of the Athlone to Galway railway line. Moving west-southwest, the mixed agricultural landscape contains a moderate number of archaeological sites with a small concentration of archaeological or historical (including the Battlefield of Aughrim (CH0564) described below) and architectural heritage sites in the village of Aughrim. Some well-preserved ringforts (CH0583 & CH0585) at Attidermot (National Monument no. 371) can be viewed through gaps in the hedge from the roadside (**Figure 4**). Additionally, ringforts CH0583 and CH0585 can be accessed via a stile from the public

road to the west (**Plates 29 – 30**). Ringfort CH0583 is known as 'St Ruth's fort' and was his command centre for the Battle of Aughrim. Harbison (1975, 88) has identified this as the location where Lieut.-General the Marquis de St Ruth was killed during the battle, however this is disputed. Hayes-McCoy's (1942; 1990) plan of the battlefield (see **Figure 5** below) marks the site of St Ruth's death 700m further southeast, close to 'The Bloody Hollow'.

***Figure 4**: Aerial view showing ringforts (CH0583 & CH0585) at Attidermot within the Consultation Area (pink wash) for Route 3*

2.3.1 Aughrim

Located on the historic route between Galway and Ballinasloe, the village of Aughrim has monastic origins. An early ecclesiastical site associated with St Conall is believed to have been established at this location, possibly as early as the eighth century. Later, in the twelfth or thirteenth century, an Augustinian Priory dedicated to St Catherine was established at Aughrim. Nothing relating to the priory survives, however it is believed to have been located at the centre of the village near the graveyard belonging to the present-day St Catherine's Church (CH3409). After the dissolution the former priory lands were granted to Richard de Burgh, Earl of Clanrickarde. The remains of an Anglo-Norman castle, listed among the possessions of a Callogh O'Kelly in 1574 and possibly in existence as early as 1324, still stands on the northern outskirts of the village (**Plate 28**) in a ruinous condition. The O'Kelly castle was severely damaged by artillery during the Williamite war when Aughrim was the centre of a key battle fought between the forces of William III and James II on 12th July 1691. The battle was ultimately lost by the 20,000-strong Irish Jacobite army with far reaching consequences for the Jacobite cause and huge loss of life. It is estimated that approximately 5000 - 7000 men from both sides lost their lives in the battle, with many buried in unmarked graves close to the village.

2.3.1.1 The Battle of Aughrim

The Battle of Aughrim was a pivotal battle of the Williamite War in Ireland that had taken place on the 12th of July 1691, near the village of Aughrim, County Galway. It was contested between the mainly Irish Jacobite army devoted to James II and the army of William III. It was possibly the most violent and bloodiest battle ever fought in Britain and Ireland where 5,000–7,000 people were massacred. William III had 18000 men under the command of General de Ginkell, and James II Irish army had 25000 men under the command of St Ruth. St Ruth took up position on Killcommoden hill, while Ginkell, occupied high ground at Urraghry,

opposite them. The Williamite forces got the upper hand and when St Ruth was killed by a cannon shot the Jacobite retreat became a wholesale rout, resulting in up to 7,000 Jacobite casualties.

There is roadside signage around the battlefield at key locations (**Plates 27 – 29**). The Battle of Aughrim Visitor Centre located in the village of Aughrim provides an insight into one of the most important and bloody battles in Irish history.

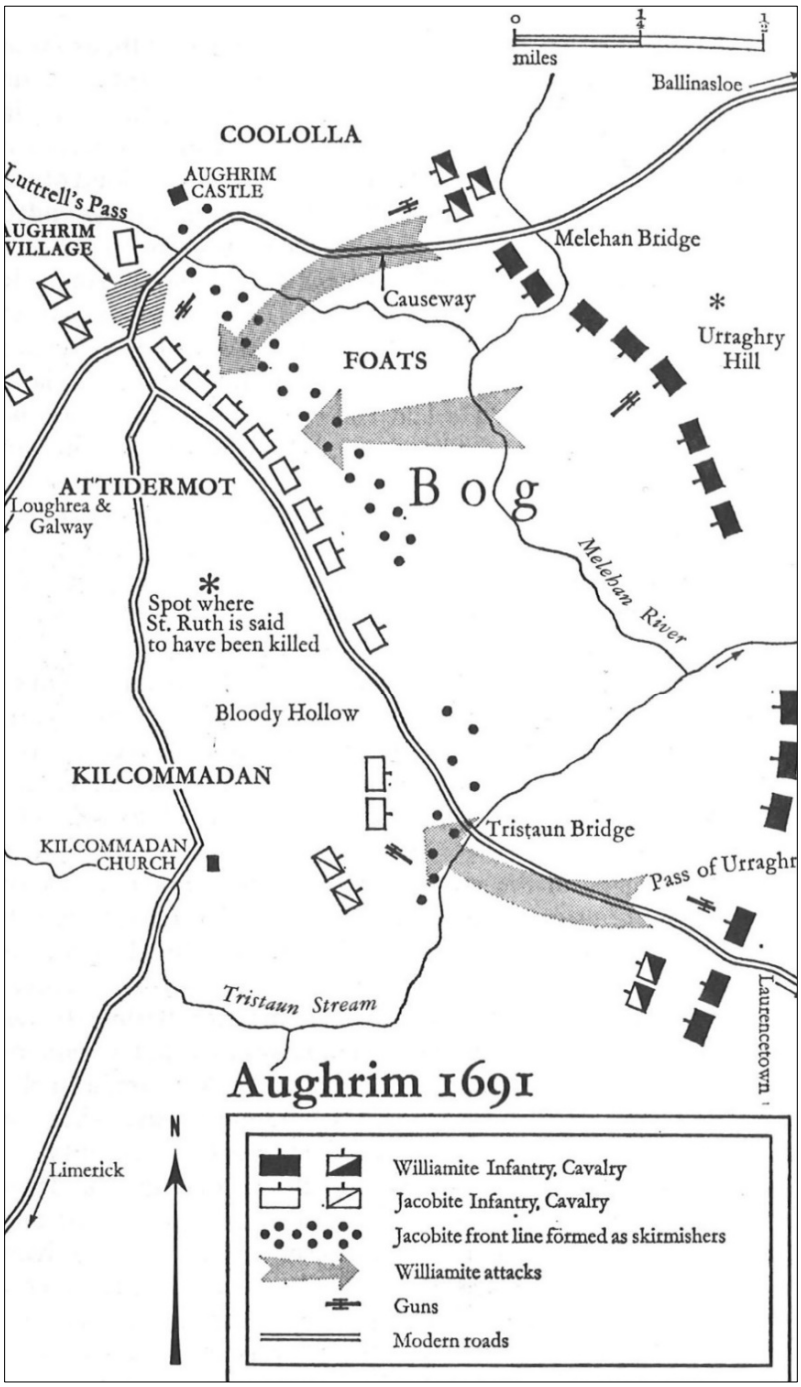

Figure 5: The Battlefield of Aughrim (Source: Hayes-McCoy 1990, 241)

West of Aughrim the route splits in two with one area (Consultation Area) lining the south of the railway line (a similar area to Route 2) and one area to the north of the M6 Motorway. The area close to the M6 contains a lower number of cultural heritage sites, mainly those recorded in the SMR/RMP. These include some redundant records, as well as a small number of ringforts (GA087-049 (CH3246) and GA087-196 (CH7495) and enclosure GA086-200 (CH7488)). Much of the landscape has a bogland character with extensive coniferous forestry plantations, with some areas of pasture mixed in and a large quarry at Killagh More immediately northeast of Killagh House (in ruins). Killagh House is described as 'in ruins' on the Cassini OS

map of *circa* 1940 and much of its associated demesne landscape has been planted with trees since the 1990s. To the north are the villages of Kilconnell and Woodlawn (covered in Route 2).

The Consultation Area to the south of the Athlone to Galway railway line covers a landscape with numerous early medieval sites, particularly ringforts and field systems, some of which have prominent above ground earthworks that are visible from public roads. A small cluster of such sites at Lissard and Ellagh can be glimpsed to the east from the L3904 Road (**Figure 6**).

***Figure 6**: Ringfort (CH4756) and field system (CH4763) at Ellagh and ringforts (CH6890 & CH6891) at Lissard (Source: Government of Ireland, Historic Environment Viewer)*

From just south of Woodlawn the two areas merge. The route corridor (Consultation Area) encompasses a huge area to the northwest of the village of New Inn and the R348 Road. Between New Inn and the Raford River – with the village of Ballyfa at the south – this area is one of moderate and poor-quality land, characterised by areas of peat, coniferous plantations and small fields of improved and unimproved pasture. This "quiet" landscape is one of few archaeological sites. However, as proven by the archaeological works on the M6 Motorway to the south, a quiet landscape with few recorded archaeological sites can conceal unrecorded archaeology subsurface. The late prehistoric hillfort of Rahally – identified during the M6 archaeological works – and the hill on which it is located dominates the landscape to the south but is now bisected by the motorway, which passes through it in a deep rock cutting.

Moving west, much of the land to the east of the Killimor River consists of unimproved bogland with some improved pasture immediately east of Killimor village. This area to the south and east of Attymon contains few recorded cultural heritage sites, the exception being Killimor Castle (CH6057) and Killimor medieval church (CH6050), which are visible from the public road. The embankment of the disused Loughrea and Attymon Light Railway is visible to the west of Killimor.

There is a marked improvement in the quality of the farmland to the west of Killimor and Attymon though there is not an associated increase in the number of cultural heritage sites. West of the Clonkeen River there is a large area of former industrial peat cutting and coniferous plantations. A number of peatland archaeological features are recorded within area where peat was extracted (none of these have surface expression or amenity value but demonstrate the potential of this landscape to contain unrecorded archaeology). Approaching the northeast of Athenry, the quality of the land improves with a regular pattern evident in the field systems, which appear to date to at least the early nineteenth-century, as depicted on the first edition OS maps.

From Athenry to Galway the route takes a similar path to Routes 1 and 2.

2.4 Route option 4

Route 4 takes the same alignment as Route 1 southward from Athlone as far as where the route meets the R357 Road just north of the River Suck. The Public Route passes close to an old graveyard on the site of an early medieval nunnery, founded by Caoireach Dheargáin who died in AD 577-8 (AFM) at Cloonburren (CH3479). This site is set on top of an esker, close to a ford over the River Shannon, with Clonmacnoise visible to the northeast and the Esker Riada, which carried the mythical road, *an tSlí Mhór* (the Great Road), from Tara to the West located immediately south. The location of this site close to the River Shannon and Clonmacnoise and adjacent to the Esker Riada demonstrates the importance of this site during the medieval period. Nearby are the prominent earthwork remains of a motte and bailey castle (CH3499), re-emphasising the importance of this landscape and control of the ford over the Shannon and transport along the Esker Riada. Cloonburren ecclesiastical site is visible and accessible from the local road just east of its junction with the Public Route, while the motte and bailey castle is visible from the local road further to east.

***Figure 7**: Aerial view showing Cloonburren ecclesiastical site (CH3479) motte and bailey castle (CH3499) and a portion of the Esker Riada, with the Public Route marked in red*

Further south the route turns east, crossing the River Shannon into County Offaly at the village of Shannonbridge. From Shannonbridge easy access to Clonmacnoise is available via the R444 Road. At Shannonbridge the route moves southward through the lands associated with the West Offaly Power Station site then crosses the Shannon in a southwest direction via a bridge used by the former industrial railway.

2.4.1 Shannonbridge

The village of Shannonbridge, formerly known as Raghra, is located within Raghra and Cloniffeen townlands on the Shannon River which acts as a boundary between Counties Offaly and Roscommon. A contemporary description by Mathew de Renzy from 1620 describes the ford at Raghra as a *'foule and daungerous waye over that reiver weare* (ASI, RO056-018003-)' suggesting a weir was used as a means to pass across the river at this point. A stone bridge (Shannonbridge (CH9226, CH7804)) of 17 arches was built across the river in 1757 giving the village its name. The bridge was fortified on several occasions, including the Napoleonic wars, and some batteries, barracks and earthworks still survive in its vicinity, including the prominent Tete-

de-Pont (CH7803) (**Plate 11**). It is believed that the modern village developed from a settlement constructed by the military a short distance south of the modern village (ASI). An industrial and riverine communications character is evident in this part of the River Shannon also, as evoked by for example crane (CH9246)) (**Plates 10-11**).

On the west of the Shannon the route runs along the former Grand Canal south-eastward through an area of industrial peat extraction. The landscape immediately west covered by the Consultation Area is a well enclosed landscape of rectangular and square fields of pasture with some arable apparent to the southwest of Clonfert Crossroads. These fields are in the main bounded by hedges, bank and ditches and post-and-wire fences. At the northern portion of the area is Clonfert ecclesiastical site (CH5211), containing St Brendan's Cathedral, a twelfth-century Romanesque building with a monumental carved doorway - one of the finest examples of Hiberno-Romanesque architecture in Ireland - is one of the oldest ecclesiastical sites in continuous use in Ireland and Clonfert Palace (CH3355), a rare example in Ireland of a substantial later seventeenth-century Bishop's Palace, now ruinous (**Plates 13-14**). Moving south from Clonfert Crossroads the landscape of mixed farming includes bogland and has a sparse number of cultural heritage sites. Of note in this area is a tower house (CH3585) in the townland of Cloonkea. Named 'Brackloon Castle' on historic cartographic depictions, this castle is a prominent landmark on the road from Clonfert Crossroads to Eyrecourt (**Plate 15**). It is a private residence, but the owners run music evenings and other events and a private tour can be arranged by appointment.

The village of Meelick on the west of the Shannon contains a cluster of cultural heritage sites. These are mainly medieval in character including Meelick Church (Franciscan Friary (CH5016) (**Plate 48**) and its associated ecclesiastical features CH5017- CH5041 (see **Appendix 2**) and a ringwork castle (CH5043) and associated earthworks. At this point the route (Public Route) follows an existing path along the alignment of the Shannon flood defences in a general southwest direction. The importance of this area as a crossing point on the Shannon is clearly demonstrated by the number of fortifications within the landscape surrounding Meelick Friary, including a number of castles from different periods, seventeenth-century bastioned forts (on Cromwell's Island) and early nineteenth-century Martello towers (*e.g.,* Meelick Martello Tower).

The Public Route follows the Shannon flood defences as far as the east of Portumna, where there is a marked increase in the number of cultural heritage sites, particularly built heritage, many of which are within the Portumna ACA. These include some well-preserved late eighteenth-century and nineteenth-century houses, for example Palmerstown House (CH4894), along with churches such as St Brigid's (CH7733). To the northeast of the town is Connacht Harbour (constructed *circa* 1810), one of several harbours constructed along the Shannon around Portumna. It is accessed from the Shannon via a canal just north of Portumna Bridge. It was built to facilitate commercial and passenger traffic and was the point where passengers were transferred to large lake steamers on Lough Derg. There is a crane similar to that at Shannonbridge at the eastern end of the canal close to Portumna Bridge. The canal and harbour are still in use providing access to the *Lough Derg Blueway*.

2.4.2 Portumna

The market town of Portumna is located north of Lough Derg at a fording point on the Shannon which acts as a boundary between Counties Galway and Tipperary. Its origin is reflected in its placename with Portumna (Ir. *Port Omna)* meaning 'Port of the Oak' (www.logainm.ie). An Anglo-Norman stronghold was founded here in the thirteenth century by Richard de Burgo, lord of Connaught. The entrance to the Shannon was fortified by a castle known as 'Black Castle' which stood on the northern shore of Lough Derg. Portumna Abbey (CH7736), a fifteenth century Dominican Friary incorporating parts of a thirteenth century Cistercian chapel dedicated to St Peter and St Paul (Harbison 1975, 98-9) is located nearby. After the Dissolution in *circa* 1582 the lands of Portumna Abbey were granted to Ulick Burke, 3rd Earl of Clanricarde. His successor constructed a large, fortified house close to the Abbey in 1618 as a replacement for the former family seat at Loughrea. The house, built in the Jacobean style, is considered one of the most important early seventeenth-century houses in Ireland (Bence-Jones 1978). The interior was gutted by fire in 1826 and it has since undergone extensive renovation works by the OPW (NIAH) (see **Plates 17-18**). Portumna castle and gardens (CH7737) are curated by the OPW and are open to the public with free admission.

The route moves through the wooded landscape of Portumna Demesne in a westerly direction to the north of Lough Derg. Part of the Public Route travels the demesne landscape to the south of the Portumna Abbey and the adjacent walled garden. The Consultation Corridor either side of the Killcrow River covers a landscape of mainly marginal bogland with some improved land.

Approaching and moving west of the village of Woodford the landscape is mixed but dominated by woodland, much of which pre-dates the nineteenth-century (as evidenced on historic cartographic sources) and bogland to the north of the Woodford River. Woodford village contains a heritage centre housed in a former schoolhouse to the south of the Woodford River, with the main thoroughfare to the north, displaying a mainly nineteenth-century and twentieth-century character.

To the south of Loughrea the landscape transforms abruptly from marginal land to mixed agriculture in regularly laid out field patterns. There is an associated increase in the number of archaeological sites with a general early and later medieval character. The Consultation Area for Route 4 covers a large portion of Dalystown Demesne to the southeast of Loughrea, which contains some extant demesne features such as a walled garden, icehouse, and farm buildings. Further northwest is Earlspark (CH4724- CH4739), the most impressive (over 369 hectares) and complete surviving high medieval deerpark in Ireland, adjoining the southeast shore of Lough Rea. This extensive archaeological landscape, including two hillforts (GA105-205---- and GA105-086----), two enclosures (GA105-208---- and GA105-087001-), a ringfort (GA105-081----), a field system (GA105-087----), a children's burial ground (GA105-083----), a standing stone (GA105-237----) and a souterrain (GA105-238----) (see **Appendix 2**) is bisected by the R351 Road.

Approaching Loughrea, the route runs along the public road along the east and north of the lough. Settlement in Loughrea appears to have its origins in the early medieval period, as evidenced by the number of settlement sites dating to that period, including a cluster of six crannogs (CH6954, CH6955, CH6956, CH6957, CH6958, CH6959) located near the norther edge of the lough that gives the town its name (**Plates 19** – **20**). The town itself is an Anglo-Norman formation, beginning with the construction of a castle (no longer extant) on the northern shore of Lough Rea in 1236 by Richard de Burgo. The medieval features that remain include a multi-phase Carmelite Priory, originally constructed at the end of the thirteenth-century, the town moat, and a sixteenth-century gatehouse (McKeon 2013) (**Plates 21 - 23**). The town moat, which still exists along 'The Walks' to the north of Loughrea's Main Street (**Plate 22**) was originally several meters wide and up to 4m deep. Loughrea Priory contains remains that reflect the occupation of the site by the Carmelites over a long period, including a range of nineteenth-century buildings, still in use. A meditation chapel in the gardens is open to the public. This is also said to be the burial place of Lieutenant General St Ruth, killed during the Battle of Aughrim in 1691.

Much of the town is within the Loughrea Architectural Conservation Area which contains a number of features of architectural value that demonstrate the development of the town from the eighteenth to the twentieth century. Noteworthy among these are former a Church of Ireland church, now Loughrea Library and St Raphael's College (former Convent). Moving along Barrick Street, the Public Route passes St Brendan's Cathedral (CH7021) and the Courthouse (CH2021) (**Plate 24**). There is a Heritage Trail around the town highlighting the built heritage and history of Loughrea (https://heritage.galwaycommunityheritage.org/content/category/places/loughrea-heritage-trail).

Each year since 1997, Loughrea has hosted the *BAFFLE Poets Festival*. There is also the *Loughrea Medieval Festival*, held over three days in August.

From Loughrea to the M6 Motorway the Consultation Corridor is aligned northwest through a mixed agricultural landscape.

From Athenry to Galway, the route is the same as Route 3.

2.5 Route option 5

Route 5 takes the same alignment as Route 4 from Athlone southward to Portumna and west through Woodford before diverging at Derrybrien. From Derrybrien this route travels westward towards Gort.

Approaching Gort, there is a marked improvement in the agricultural capacity of the land to the north of Lough Cutra around Kilbeacanty, which is mirrored by a marked increase in cultural heritage sites – mostly archaeology – including many ringforts and later features.

2.5.1 Gort

The town of Gort: *An Gort*, known as Gort Inse Guaire derives its name from *gort* (field), *inse* (island) and *Guaire* relating to Guaire Aidne mac Colmáin, a sixth-century King of Connacht (https://www.logainm.ie/en/19341). Gort is a historic town with a rich architectural heritage. The historic core of the town includes a number of late eighteenth-century and nineteenth-century houses and shopfronts, for

example along Broad Street. Some notable features include Gort Library, formerly a church (CH1184), St Colman's Church (CH1186), Gort Courthouse (CH0733) and statue of Christ the King (CH1197) within a triangular marketplace.

Yeats' Tower/Thoor Ballylee, a fifteenth-century tower house and attached thatched house at Ballylee (CH1237 & CH1236) is located to the north-northeast of Gort (**Plate 51**). This site was the summer residence of the poet W. B. Yeats, awarded the Nobel Prize of Literature in 1923, and now houses an interpretive centre and studio run by the Yeats Thoor Ballylee Society. The complex, set on the Ballylee/Streamstown River includes some outbuildings and Ballylee Bridge (CH0715).

Within the Consultation Area, to the west of Thoor Ballylee is a large enclosure at Newtown (CH7516), which is visible on a ridge to the northwest of the public road. This well-preserved earthen enclosure, which commands vistas over the immediate landscape has a group of other features clustered nearby to the southwest, including two ringforts, a souterrain and a children's burial ground (**Figure 8**) (see **Appendix 2**).

***Figure 8**: Enclosure (CH7516) ringforts (CH7517 & CH7519) and souterrain (CH7518) at Newtown and children's burial ground (CH8011) at Rinrush (Source: Government of Ireland, Historic Environment Viewer)*

From Gort there is easy access to *The Burren & Cliffs of Moher UNESCO Global Geopark* in County Clare.

West of Gort the Public Route runs in a westerly direction to the south of Coole Lough (part of Coole Demesne).

2.5.2 Coole Demesne

Coole is best known as the home of Lady Augusta Gregory, a poet, author and playwright, and a founding member of the Abbey Theatre. During the early twentieth century Coole Park, was at the centre of the Irish Literary Revival. William Butler Yeats, George Bernard Shaw, John Millington Synge and Sean O' Casey and many others carved their initials on the Autograph Tree, a copper beech still alive within the Walled garden (https://www.coolepark.ie/). By the beginning of the twentieth century the estate was in decline and in 1906 Walter R. Gregory is reported to have held Coole House and about 200 acres of untenanted demesne lands (http://landedestates.nuigalway.ie/LandedEstates/jsp/estate-show.jsp?id=753). In June 1927 the "Tuam Herald" reported that the Land Commission had taken over the estate of Lady Margaret Gregory at Coole

(Ibid). The country house was demolished in 1941 but is memorialised in the poem 'The Wild Swans at Coole' by one of its most frequent visitors W.B. Yeats (https://www.buildingsofireland.ie/buildings-search/building/30412204/coole-park-coole-demesne-galway).

The main features of note include the remains of Coole Park, country house (CH3788), its associated walled garden (CH1431), Coole Park Visitor Centre (CH1430), formerly a courtyard of outbuildings and nearby Kiltartan Roman Catholic Church (CH6231) and Kiltartan Gregory Museum (CH6232) (**Plate 52**), formerly a national school.

Coole Park is now home to a nature reserve of approximately 400 hectares of wetland and woodland, operated by the Irish Government (**Figure 9**). Coole Park Visitor Centre and Gardens are owned and run by the Office of Public Works in collaboration with the National Parks and Wildlife Service and have been open to the public since 1992.

Figure 9: Image of Coole House, demolished by the State in 1941 (Source: http://landedestates.nuigalway.ie/LandedEstates/jsp/estate-show.jsp?id=753)

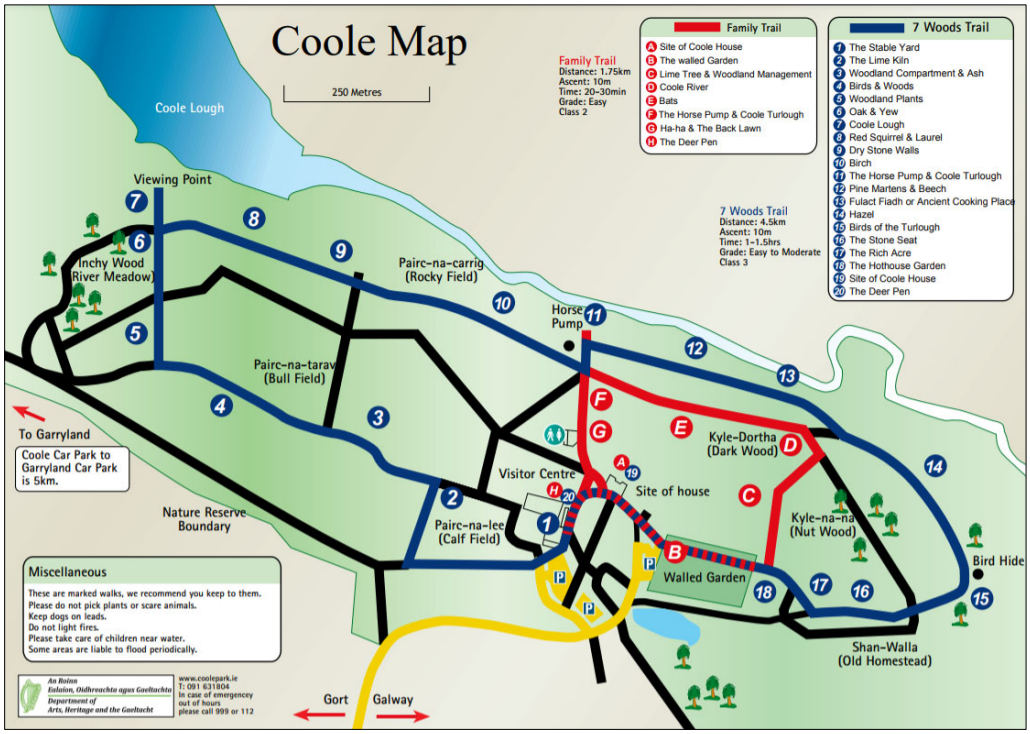

Figure 10: Map of Coole Park Nature Reserve (Source: https://www.coolepark.ie/trails/)

The first edition OS map shows Coole Park, built *circa* 1785, with an open view of the Coole River to the west, walled garden to the northeast, parterre, stables, coach house, etc. to the south and southeast and large fields in a regular pattern enclosure to the east separated from the house by a wide bank of woodland.

Further west, the Consultation Corridor includes part of the karst landscape of southwest Galway, which forms part of The Burren Lowlands (**Figure 11**) before turning northward towards Kinvara. *This is a* mixed agricultural landscape of mainly square and rectangular fields bounded by traditional drystone walls and hedges and a moderate number of early medieval sites.

***Figure 11**: Aerial view showing the Public Route (pink line) and Consultation Area (pink wash) with the karst landscape west of Gort*

2.5.3 Kinvara

At Kinvara Route 5 encounters the Wild Atlantic Way, a tourism trail that winds its way along 2600km of the west coast of Ireland from Muff on the Inishowen Peninsula, County Donegal to Kinsale, County Cork. Cinn Mhara derived from the Irish ceann (also: cionn) (*head* or *headland)* and mara (*sea*) *(*https://www.logainm.ie/en/20595*).*

Kinvara appears to have its origins in the early medieval period and the establishment of an early church there dedicated to St Coman (CH6311). A number of late eighteenth-century and nineteenth-century buildings are evident within the core of the town and a pleasant late eighteenth-century harbour (CH2250) to the north. Kinvara is home to two annual festivals, *Cruinniú na mBád* ("gathering of the boats") in mid-August and *Fleadh na gCuach* ("the cuckoo festival") an Irish music festival in May.

Moving northeast along the N67 Road a good example of a thatched house (Dungora Cottage, CH2666) is visible on the right, with views of Kinvara Bay on the left as Dunguaire Castle comes into view. Dunguaire Castle (CH4697), an iconic landmark in this landscape built in 1520 by the O'Hynes, is run by Shannon Heritage and is open to the Public.

Moving north from Kinvara, the Consultation Corridor covers the landscape between the N67 and the eastern shore of Kinvara Bay. Approaching Ballinderreen a heavily enclosed landscape of hedges and drystone walls is encountered. The walls follow a general east to west trend extending from the north to south orientated primary lines. This is evidence of post-medieval and early modern agricultural landuse in this landscape.

Much of the archaeological heritage as far as Kilcolgan is early medieval in date. This includes Drumacoo ecclesiastical site (CH4606), a multiperiod church site associated with St Sorney (**Plate 49**). This site also contains associated features, including a graveyard (CH4607), St George Mausoleum (CH4608) and St Sorney's holy well (CH4609) (**Plate 50**).

Kilcolgan Castle (CH5693 & CH5698), a detached Gothic Revival country house, built in 1801 incorporating remnants of an earlier tower house overlooking the Kilcolgan River, is now in use as a guesthouse and can be viewed from the L8563 Road.

To the west of Kilcolgan village and north of Drumcoo is Tyrone House (CH8709), a seven-bay three-storey over basement country house, built in 1779. The house can be viewed from the L8563 Road and has good vistas over the Kilcolgan River and Dunbulcaun Bay to the north but is in a roofless and partly ruinous state.

Crossing the Kilcolgan River moving northward, the landscape towards Clarinbridge is similar but somewhat more wooded than the area to the south, particularly to the east of the N67 Road and the demesne landscape of Kilcornan Demesne.

2.5.4 Clarinbridge

Clarinbridge directly translates as Droichead an Chláirín (https://www.logainm.ie/en/18619?s=Clarinbridge). This scenic village is set close to the mouth of the Clarin River at the northeast end of Dunbulcaun Bay. The current bridge over the Clarin River dates to the middle eighteenth century (according to the NIAH) and although the historic environment around the village contains earlier features, including some within the Kilcornan Demesne, the core of the village dates to the mid-nineteenth century.

Kilcornan House (CH2745), a decorative country house, designed by George Papworth for Sir Thomas Redington is now owned by Brothers of Charity, who encourage public access. Much of the woods associated with the demesne are owned by Coillte and are publicly accessible.

Clarinbridge retains an attractive streetscape along the N67 Road, including Paddy Burke's Pub (CH1434), a thatched two-storey end of terrace building built *circa* 1850. Clarinbridge is home to the *Clarinbridge Oyster Festival*, held there each September since 1954.

The Consultation Corridor between the Clarinbridge and Oranmore Rivers covers a huge area either side of the N67 Road. The agricultural character of the land is generally pasture, set out in a ladder-like formation of field systems, much of which is depicted on the first edition OS map indicating that it dates to at least the early nineteenth century. To the west of the N67 Road is the ecclesiastical enclosure of Cregganna More (CH4139) (**Figure 12**). Portions of this site are visible through gaps in the roadside boundary but the eastern portion (roadside) of the monument is heavily overgrown and difficult to distinguish from this location.

***Figure 12**: Aerial view showing* ecclesiastical enclosure of Cregganna More (CH4139) beside the N67 Road *(Source: Government of Ireland, Historic Environment Viewer)*

From Oranmore to Galway the route takes a similar alignment to Routes 3 and 4.

3 OPTION SELECTION

3.1 Route option 1

Route 1 covers a wide range of rural landscapes, as well as some urban and suburban landscapes. There is a moderate number of cultural heritage sites recorded within the study polygons associated with this route - 430 in total. These include 243 sites recorded in the SMR/RMP; 160 NIAH sites; 170 RPS and no National Monuments, though there are some close to the route, particularly around Athlone. A total of 126 of the cultural heritage sites covered by this route are multi-designation sites.

A total of 39 significant cultural heritage sites have been identified within the study area associated with Route 1 (see **Table 1** and **Appendix 2**). In almost all cases local adjustments in the alignment and other measures may be employed to mitigate potential direct and indirect impacts of a negative nature on cultural heritage. A direct negative impact was identified on a recorded cultural heritage feature on this route. The recorded cultural heritage feature to be impacted is Ballinasloe Canal (CH0350), however the level of the impact is considered to be slight. In addition, the Consultation Area for Route 1 covers a large portion of landscape to the west of Ballinasloe, including much of Garbally Demesne. There is potential for a direct impact on undesignated features within Garbally Demesne (CH5093) landscape. This potential impact would be direct and negative with a potential impact level of slight, however they can be ameliorated by routing the cycleway alignment on existing public roads and paths within Garbally Demesne.

The Consultation Area for Route 1 covers a large portion of Mountbellew Demesne and the Public Route is also set to follow existing paths within the demesne. There is a potential to impact on unrecorded features of the demesne landscape. This potential impact would be direct and negative with a potential impact level of slight. This potential impact can be ameliorated by keeping the Public Route on the alignment of existing roads and paths within the demesne.

The Public Route travels through a mostly wooded landscape of Monivea Demesne. Although direct impacts on the recorded elements associated with Monivea Castle (CH7309) and Country House (CH7311) and associated recorded demesne features are avoided, there is a potential to impact on unrecorded features of the demesne landscape. This potential impact would be direct and negative with a potential impact level of slight. This potential impact can be ameliorated by keeping the Public Route on the alignment of existing roads and paths within Monivea Demesne.

Overall, this route contains a desirable mix of cultural heritage sites that would provide a positive cultural contribution to the proposed cycleway and enhance the amenity value of the cycleway.

Table 1: *Option 1 Impact Assessment*

CHS Ref.	***Class***	***Designation***	***Type of Potential Impact***	***Potential Impact Level***
CH0128	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH0130	House	SMR/RMP, NIAH	None predicted	None
CH0125	Former mill	SMR/RMP, NIAH, RPS	None predicted	None
CH0127	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH0133	Bridge	SMR/RMP, NIAH, RPS	None predicted	None
CH0350	Canal	SMR/RMP, NIAH	Direct	Negative, slight

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH0365	Chapel	NIAH, RPS	None predicted	None
CH0449	Bridge	NIAH, RPS	None predicted	None
CH1005	Railway bridge	NIAH, RPS	None predicted	None
CH1623	Pier	NIAH	None predicted	None
CH1625	Public house	NIAH, RPS	None predicted	None
CH1626	Monument	NIAH, RPS	None predicted	None
CH1888	Railway crossing keeper's house	NIAH, RPS	None predicted	None
CH1889	Goods shed	NIAH, RPS	None predicted	None
CH1890	Station master's house	NIAH, RPS	None predicted	None
CH1891	Former railway station	NIAH, RPS	None predicted	None
CH1892	Foot bridge	NIAH, RPS	None predicted	None
CH2377	Ringfort (rath)	SMR/RMP	None predicted	None
CH2382	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH2515	Railway bridge	NIAH, RPS	None predicted	None
CH3066	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH3336	Country House	SMR/RMP, NIAH	None predicted	None
CH4705	Monument	SMR/RMP, NIAH, RPS	None predicted	None
CH5093	Country House (in use as school)	SMR/RMP, NIAH	None predicted	None
	Demesne landscape associated with Garbally Country House (CH5093),		Direct	Negative, slight

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH5252	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH7064	House	SMR/RMP, NIAH, RPS	None predicted	None
CH7172	Tower house	SMR/RMP	None predicted	None
CH7314	Mausoleum	SMR/RMP, NIAH, RPS	None predicted	None
	Demesne landscape associated with Monivea Castle (CH7309) and Country House (CH7311)		Direct	Negative, slight
CH7356	Country House and associated walled garden	SMR/RMP, NIAH, RPS	None predicted	None
	Demesne landscape associated with Mountbellew Country House (CH7356)		Direct	Negative, slight
CH7357	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH7599	Tower house	SMR/RMP, RPS	None predicted	None
CH7608	Church (in use as library)	SMR/RMP, NIAH, RPS	None predicted	None
CH8586	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH8587	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH8593	Church	SMR/RMP, NIAH	None predicted	None
CH9024	Bridge	NIAH, RPS	None predicted	None
CH9093	Harbour master's house	NIAH, RPS	None predicted	None

CHS Ref.	Class	Designation	Type of Potential Impact	Potential Impact Level
CH9097	Norman castle	SMR/RMP, NIAH, RPS	None predicted	None
CH9108	Series of ramparts and batteries	NIAH, RPS	None predicted	None

3.2 Route option 2

The landscape covered by Route 2 is slightly less varied than Route 1 and considerably less varied than Routes 4 and 5. This is the shortest and the most direct of the five proposed routes and its associated study area covers the least area. Consequently, this route includes the smallest number of cultural heritage sites, 176 in total. These include 103 sites recorded in the SMR/RMP; 67 NIAH sites; 58 RPS and no National Monuments, though there are some close to the route, particularly around Athlone and Athenry. A total of 50 of the cultural heritage sites covered by this route are multi-designation sites. Many of the architectural heritage sites recorded in the NIAH and RPS are associated with railway infrastructure along the route.

A total of 16 significant cultural heritage sites have been identified within the study area associated with Route 2 (see **Table 2** and **Appendix 2**). Although there is a low number of cultural heritage sites within the areas covered by this route, many of these are associated with existing railway infrastructure and will not be directly impacted by the proposals. In addition, local adjustments in the alignment and other measures may be employed to mitigate potential direct and indirect impacts of a negative nature on cultural heritage.

This is the least diverse in terms of landscape and cultural heritage, however by following the railway line and staying with areas previously disturbed by the construction of the line, there is much reduced chance of negative impacts of both recorded and unrecorded cultural heritage. A negative aspect of this route is that there are long distances between the main concentrations of cultural heritage where there are few visible or remarkable sites. However, this route travels through urban areas with desirable built heritage, such as Athlone and Ballinasloe (and the demesne landscape of Garbally), through railway stations at Woodlawn and Attymon and brings travellers to within very short distances of National Monuments like Kilconnell Friary, close to the battlefield landscape of Aughrim and into the unique medieval town of Athenry.

Table 2: *Option 2 Impact Assessment*

CHS Ref.	Class	Designation	Type of Potential Impact	Potential Impact Level
CH1888	Railway crossing keeper's house	NIAH, RPS	None predicted	None
CH1889	Goods shed	NIAH, RPS	None predicted	None
CH1890	Station master’s house	NIAH, RPS	None predicted	None
CH1891	Former railway station	NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH1892	Foot bridge	NIAH, RPS	None predicted	None
CH0600	Railway station	NIAH, RPS	None predicted	None
CH0601	Railway bridge	NIAH, RPS	None predicted	None
CH7599	Tower house	SMR/RMP, RPS	None predicted	None
CH7608	Church (in use as library)	SMR/RMP, NIAH, RPS	None predicted	None
N/A	Railway bridge	NIAH, RPS	None predicted	None
CH9120	Railway engine shed	NIAH, RPS	None predicted	None
CH9123	Railway water tower	NIAH, RPS	None predicted	None
CH7172	Tower house	SMR/RMP	None predicted	None
CH1623	Pier	NIAH	None predicted	None
CH1625	Public house	NIAH, RPS	None predicted	None
CH1626	Monument	NIAH, RPS	None predicted	None

3.3 Route option 3

Route 3 has a similar in trajectory to Route 2 but encompasses a wider landscape and consequently many more cultural heritage sites (717 in total).

These include 540 sites recorded in the SMR/RMP; 159 NIAH sites; 154 RPS and 7 National Monuments. A total of 118 of the cultural heritage sites covered by this route are multi-designation sites. It must be noted that the higher numbers of cultural heritage sites on this route is a reflection of the wider areas covered by the study area rather than any increase in density. A total of 49 significant cultural heritage sites have been identified within the study area associated with Route 3 (see **Table 3** and **Appendix 2**).

Overall, this route covers a wide area, including more or less all of the cultural heritage recorded in Route 2. There is consequently a higher potential for negative impact on cultural heritage, but as noted above, local diversions and careful routing, along with robust mitigation measures can avoid many of the negative impacts and mitigate the remainder. The only direct negative impact identified on this route on a recorded cultural heritage site is on the former Ballinasloe Canal (CH0350), however the level of the impact is considered to be slight. This route also has potential direct impacts on designed landscapes. The Consultation Area for Route 3 covers a large swathe of the landscape to the south of the Athlone to Galway railway line. This includes the battlefield landscape for the Battle of Aughrim and the demesne landscapes of Garbally House and Woodlawn House.

There is potential for direct impacts on undesignated features within the landscapes of Garbally Demesne and Woodlawn Demesne. These potential impacts would be direct and negative with a potential impact level of slight, however they can be avoided by routing the cycleway alignment on existing public roads and paths.

The final route can be designed to avoid direct impact with the recorded cultural heritage features within the Battle of Aughrim landscape, however there is potential for direct impact on the battlefield landscape itself and associated undesignated features. This potential impact would be direct and negative with a potential impact level of slight. This potential impact can be avoided by routing the cycleway alignment on existing public roads.

Like Route 2, this route travels through urban areas with desirable built heritage, such as Athlone, Ballinasloe and Athenry as well as connecting with The Battle of Aughrim site and Kilconnell Friary but also a wider range of cultural heritage sites, including demesne landscapes and clusters of early medieval ringforts.

Table 3: *Option 3 Impact Assessment*

CHS Ref.	***Class***	***Designation***	***Type of Potential Impact***	***Potential Impact Level***
CH0019	Kilconnell Abbey	SMR/RMP	None predicted	None
CH0350	Canal	SMR/RMP, NIAH	Direct	Negative, slight
CH0365	Chapel	NIAH, RPS	None predicted	None
CH0472	Castle	SMR/RMP	None predicted	None
CH0474	Town defences	SMR/RMP	None predicted	None
CH0475	Dominican Priory	SMR/RMP	None predicted	None
CH0476 & CH0483	Heritage Centre (former church)	SMR/RMP, NIAH, RPS	None predicted	None
CH0481	Market Cross	SMR/RMP, NIAH, RPS	None predicted	None
CH0541	Country House	NIAH, RPS	None predicted	None
CH0564	Battle site	SMR/RMP	Direct	Negative, slight
CH0583	Ringfort (rath)	SMR/RMP	None predicted	None
CH0585	Ringfort (rath)	SMR/RMP	None predicted	None
CH0600	Railway station	NIAH, RPS	None predicted	None
CH0601	Railway bridge	NIAH, RPS	None predicted	None
CH1623	Pier	NIAH, RPS	None predicted	None
CH1625	Public house	NIAH, RPS	None predicted	None
CH1626	Monument	NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH1815	House	NIAH	None predicted	None
CH1888	Railway crossing keeper's house	NIAH, RPS	None predicted	None
CH1889	Goods shed	NIAH, RPS	None predicted	None
CH1890	Station master's house	NIAH, RPS	None predicted	None
CH1891	Former railway station	NIAH, RPS	None predicted	None
CH1892	Foot bridge	NIAH, RPS	None predicted	None
CH2797	Railway Station	NIAH, RPS	None predicted	None
CH3409	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH4705	Monument	SMR/RMP, NIAH, RPS	None predicted	None
CH4756	Ringfort (rath)	SMR/RMP	None predicted	None
CH4763	Field system	SMR/RMP	None predicted	None
CH5093	Country House (in use as school)	SMR/RMP, NIAH	None predicted	None
	Demesne landscape associated with Garbally Country House (CH5093),		Direct	Negative, slight
CH5447	House	SMR/RMP, NIAH, RPS	None predicted	None
CH5817	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH6890	Ringfort (rath)	SMR/RMP	None predicted	None
CH6891	Ringfort (rath)	SMR/RMP	None predicted	None
CH7172	Tower house	SMR/RMP	None predicted	None
CH7599	Tower house	SMR/RMP, RPS	None predicted	None
CH7608	Church (in use as library)	SMR/RMP, NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH8586	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH8587	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH8593	Church	SMR/RMP, NIAH	None predicted	None
CH8598	Bridge	SMR/RMP, NIAH, RPS	None predicted	None
CH8796	Country House	SMR/RMP, NIAH	None predicted	None
CH8798	Icehouse	SMR/RMP, NIAH	None predicted	None
CH8806	Gate lodge	SMR/RMP, NIAH, RPS	None predicted	None
	Demesne landscape associated with Woodlawn House (CH8796), icehouse (CH8798) and gate lodge (CH8806)		Direct	Negative, slight
CH9024	Bridge	NIAH, RPS	None predicted	None
CH9026	Church	NIAH, RPS	None predicted	None
CH9093	Harbour master's house	NIAH, RPS	None predicted	None
CH9097	Norman castle	SMR/RMP, NIAH, RPS	None predicted	None
CH9108	Series of ramparts and batteries	NIAH, RPS	None predicted	None
CH9120	Railway engine shed	NIAH, RPS	None predicted	None

3.4 Route option 4

Route 4 encompasses a much more varied route to the previous three, including a long swathe of the Shannon and the lacustrine areas around Portumna and Loughrea. There is also a more varied cultural landscape that includes features on the eastern side of the Shannon. From Shannonbridge there is easy access to Clonmacnoise, one of Irelands most important and best-known ecclesiastical sites.

A total of 732 cultural heritage sites are covered by this route, including 575 sites recorded in the SMR/RMP; 146 NIAH sites; 142 RPS and 2 National Monuments. A total of 112 of the cultural heritage sites covered by

this route are multi-designation sites. A total of 51 significant cultural heritage sites have been identified within the study area associated with Route 4 (see **Table 4** and **Appendix 2**).

This route is longer that the previous three and consequently contains a greater number of cultural heritage sites. It covers a more diverse natural and cultural landscape, which for a visitor attraction point of view could be considered positive.

The Public Route for Route 5 travels through the demesne landscape of Portumna Castle (CH7737), to the south of Portumna Abbey (CH7736) and the adjacent walled garden, close to the northern shore of Lough Derg. Although the proposed development will avoid direct impacts on the recorded cultural heritage sites within the demesne, there is a potential to impact on unrecorded features of the demesne landscape. This potential impact would be direct and negative with a potential impact level of slight. Theis potential impact can be ameliorated by keeping to the alignment of existing roads and paths within Portumna Demesne.

The Consultation Area for Route 4 covers a large swathe of the landscape to the west of the R315 Road through Earlspark high medieval deerpark and its associated archaeological landscape (CH4724-CH4732, CH4736-CH4739), just south and southeast of Lough Rea. The Earlspark landscape is designated a Zone of Notification. Any potential route that diverges from public roads and existing tracks has the potential to have a negative direct impact on unrecorded cultural heritage features and the landscape itself. However, careful designing and local re-routing and other measures can mitigate potential significant negative effects on the recorded cultural features in this landscape.

This route provides an opportunity to view both Earlspark archaeological landscape (and deerpark) and the early medieval lacustrine settlement (crannogs) on Lough Rea from the R351 Road. However, these features could easily be overlooked as they are not as visually impressive as much of the built heritage along this and other routes.

Table 4: *Option 4 Impact Assessment*

CHS Ref.	***Class***	***Designation***	***Type of Potential Impact***	***Potential Impact Level***
CH0472	Castle	SMR/RMP	None predicted	None
CH0474	Town defences	SMR/RMP	None predicted	None
CH0475	Dominican Priory	SMR/RMP	None predicted	None
CH0476 & CH0483	Heritage Centre (former church)	SMR/RMP, NIAH, RPS	None predicted	None
CH0481	Market Cross	SMR/RMP, NIAH, RPS	None predicted	None
CH0541	Country House	NIAH, RPS	None predicted	None
CH0802	Harbour	NIAH, RPS	None predicted	None
CH1623	Pier	NIAH	None predicted	None
CH1625	Public house	NIAH, RPS	None predicted	None
CH1626	Monument	NIAH, RPS	None predicted	None
CH1888	Railway crossing keeper's house	NIAH, RPS	None predicted	None
CH1889	Goods shed	NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH1890	Station master's house	NIAH, RPS	None predicted	None
CH1891	Former railway station	NIAH, RPS	None predicted	None
CH1892	Foot bridge	NIAH, RPS	None predicted	None
CH2021	Courthouse	NIAH, RPS	None predicted	None
CH3355	House (former Bishop's Palace)	SMR/RMP, NIAH, RPS	None predicted	None
CH3479	Early ecclesiastical complex	SMR/RMP	None predicted	None
CH3499	Motte and bailey castle	SMR/RMP	None predicted	None
CH3585	House	SMR/RMP, RPS	None predicted	None
CH4724-CH4732, CH4736-CH4739	High medieval deerpark and archaeological landscape	SMR/RMP	Direct	Negative, slight
CH4894	House	SMR/RMP, NIAH, RPS	None predicted	None
CH5016	Franciscan friary	SMR/RMP, NIAH,	None predicted	None
CH5043	Earthworks associated with ringwork castle	SMR/RMP	None predicted	None
CH5211	Church/ecclesiastical site	SMR/RMP, NIAH, RPS	None predicted	None
CH6050	Church	SMR/RMP	None predicted	None
CH6057	Castle	SMR/RMP, NIAH, RPS	None predicted	None
CH6954	Crannog	SMR/RMP	None predicted	None
CH6955	Crannog	SMR/RMP	None predicted	None
CH6956	Crannog	SMR/RMP	None predicted	None
CH6957	Crannog	SMR/RMP	None predicted	None
CH6958	Crannog	SMR/RMP	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH6959	Crannog	SMR/RMP	None predicted	None
CH7021	Cathedral	SMR/RMP	None predicted	None
CH7172	Tower house	SMR/RMP	None predicted	None
CH7599	Tower house	SMR/RMP, RPS	None predicted	None
CH7608	Church (in use as library)	SMR/RMP, NIAH, RPS	None predicted	None
CH7733	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH7736	Dominican Friary	SMR/RMP	None predicted	None
CH7737	Castle - Jacobean house	SMR/RMP, NIAH, RPS	None predicted	None
	Demesne landscape associated with Portumna Castle (CH7737) and Portumna Abbey (CH7736)		Direct	Negative, slight
CH7803	Fortification	SMR/RMP, NIAH, RPS	None predicted	None
CH7804	Bridge	SMR/RMP, NIAH, RPS	None predicted	None
CH9024	Bridge	NIAH, RPS	None predicted	None
CH9025	Gallery	NIAH	None predicted	None
CH9026	Church	NIAH, RPS	None predicted	None
CH9093	Harbour master's house	NIAH, RPS	None predicted	None
CH9097	Norman castle	SMR/RMP, NIAH, RPS	None predicted	None
CH9108	Series of ramparts and batteries	NIAH, RPS	None predicted	None
CH9120	Railway engine shed	NIAH, RPS	None predicted	None
CH9226	Bridge	SMR/RMP, NIAH, RPS	None predicted	None

CHS Ref.	Class	Designation	Type of Potential Impact	Potential Impact Level
CH9246	Quay Crane	NIAH, RPS	None predicted	None

3.5 Route option 5

Of the five route options Route 5 is the longest and consequently has the greatest number of recorded cultural heritage sites. This route also covers the most diverse set of landscapes and singularly including the karst landscape of southwest Galway and the seascapes of Galway Bay. This route provides access to the Slieve Aughty Mountains and a wide swathe of the cultural landscape of South County Galway, as well as the maritime cultural landscape of south and east Galway Bay. In addition, this route connects with Coole Park and Thoor Ballylee, literary landmarks in County Galway.

A total of 794 cultural heritage sites are covered by this route. These include 607 sites recorded in the SMR/RMP; 192 NIAH sites; 167 RPS and 12 National Monuments. A total of 143 of the cultural heritage sites covered by this route are multi-designation sites. A total of 48 significant cultural heritage sites have been identified within the study area associated with Route 5 (see **Table 5** and **Appendix 2**).

The Public Route for Route 5 travels through the demesne landscape of Portumna Castle (CH7737), to the south of Portumna Abbey (CH7736) and the adjacent walled garden, close to the northern shore of Lough Derg. Although the proposed development will avoid direct impacts on the recorded cultural heritage sites within the demesne, there is a potential to impact on unrecorded features of the demesne landscape. This potential impact would be direct and negative with a potential impact level of slight. This potential impact can be ameliorated by keeping to the alignment of existing roads and paths within Portumna Demesne.

The Consultation Area for Route 5 covers a large swathe of the landscape to the northwest of the N67 Road, including through the demesne landscape of Kilcolgan Castle (CH5693 & CH5698). This could have a potential slight negative impact. This potential impact on the demesne landscape can be ameliorated by keeping to the alignment of existing roads.

As mentioned above, careful designing and local re-routing and other measures can mitigate potential significant negative effects. This route provides an admixture of the most diverse natural environments available within the five route options. As the longest route, it also contains the largest number of cultural heritage sites, thus providing desirable assortment of cultural heritage sites for the proposed cycleway. However, unlike the other four routes, this one does not include Athenry, a medieval gem in Connacht. This is a negative on an otherwise overwhelmingly positive route option.

Table 5: *Option 5 Impact Assessment*

CHS Ref.	Class	Designation	Type of Potential Impact	Potential Impact Level
CH5211	Church/ecclesiastical site	SMR/RMP, NIAH, RPS	None predicted	None
CH3585	House	SMR/RMP, RPS	None predicted	None
CH0733	Courthouse	NIAH	None predicted	None
CH0802	Harbour	NIAH, RPS	None predicted	None
CH1184	Library (former church)	SMR/RMP, NIAH, RPS	None predicted	None
CH1186	Church	SMR/RMP, NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH1197	Monument	NIAH, RPS	None predicted	None
CH1237 & CH1236	Tower house and thatched house	SMR/RMP, NIAH	None predicted	None
CH1430	Courtyard of outbuildings	NIAH	None predicted	None
CH1431	Walled Garden	NIAH	None predicted	None
CH1434	Public house	NIAH	None predicted	None
CH1623	Pier	NIAH	None predicted	None
CH1625	Public house	NIAH, RPS	None predicted	None
CH1626	Monument	NIAH, RPS	None predicted	None
CH2250	Harbour	NIAH, RPS	None predicted	None
CH2666	Thatched house	NIAH	None predicted	None
CH2745	House	NIAH	None predicted	None
CH3355	House (former Bishop's Palace)	SMR/RMP, NIAH, RPS	None predicted	None
CH3479	Early ecclesiastical complex	SMR/RMP	None predicted	None
CH3499	Motte and bailey castle	SMR/RMP	None predicted	None
CH3788	Country house	SMR/RMP, NIAH	None predicted	None
CH4139	Enclosure	SMR/RMP	None predicted	None
CH4606	Ecclesiastical site	SMR/RMP	None predicted	None
CH4697	Tower house	SMR/RMP	None predicted	None
CH4894	House	SMR/RMP, NIAH, RPS	None predicted	None
CH5693 & CH5698	Country house	SMR/RMP, NIAH	None predicted	None
	Demesne landscape associated with		Direct	Negative, slight

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
	Kilcolgan Demesne (CH5693 & CH5698)			
CH6231	Church	SMR/RMP, NIAH	None predicted	None
CH6232	School (in use as museum)	SMR/RMP, NIAH	None predicted	None
CH6311	Church	SMR/RMP, RPS	None predicted	None
CH7172	Tower house	SMR/RMP	None predicted	None
CH7516	Large circular enclosure	SMR/RMP	None predicted	None
CH7599	Tower house	SMR/RMP, RPS	None predicted	None
CH7608	Church (in use as library)	SMR/RMP, NIAH, RPS	None predicted	None
CH7733	Church	SMR/RMP, NIAH, RPS	None predicted	None
CH7736	Dominican Friary	SMR/RMP	None predicted	None
CH7737	Castle - Jacobean house	SMR/RMP, NIAH, RPS	None predicted	None
	Demesne landscape associated with Portumna Castle (CH7737) and Portumna Abbey (CH7736)		Direct	Negative, slight
CH7803	Fortification	SMR/RMP, NIAH, RPS	None predicted	None
CH7804	Bridge	SMR/RMP, NIAH, RPS	None predicted	None
CH8709	Country house	SMR/RMP, NIAH	None predicted	None
CH9024	Bridge	NIAH, RPS	None predicted	None
CH9025	Gallery	NIAH, RPS	None predicted	None
CH9026	Church	NIAH, RPS	None predicted	None
CH9093	Harbour master's house	NIAH, RPS	None predicted	None

CHS Ref.	*Class*	*Designation*	*Type of Potential Impact*	*Potential Impact Level*
CH9097	Norman castle	SMR/RMP, NIAH, RPS	None predicted	None
CH9108	Series of ramparts and batteries	NIAH, RPS	None predicted	None
CH9120	Railway engine shed	NIAH, RPS	None predicted	None
CH9226	Bridge	SMR/RMP, NIAH, RPS	None predicted	None
CH9246	Quay Crane	NIAH, RPS	None predicted	None

4 CONCLUSION

In summary, all the potential routes contain a blend of cultural heritage sites that would provide a positive contribution to the visual amenity of a cycle route. The longest routes contain the largest numbers of sites and the most varied natural environments and consequently have the highest potential for negative impacts. In most cases, negative impacts on recorded cultural heritage sites can be avoided by careful design and micro-routing. In the case of Options 1 and 3, the public route comes into direct contact with the former Ballinasloe Canal. As the canal has been filled-in and is now in use as an access track the potential impact on this feature, though direct, will be slight and can be adequately ameliorated through careful design and potentially other mitigation measures, as necessary. Routes 1, 3, 4 and 5 also traverse a small number of designed landscapes such as historic demesnes and the Battle of Aughrim battle site. At these locations, careful design of the route, using existing roads and paths can ameliorate impacts. Aa more detailed impact assessment will be carried out on the preferred route during EIAR stage.

Routes 1, 3, 4 and 5 would allow for the reappropriation of former peatland industrial railways lines to a cycleway is a very apt reuse of former industrial sites and transport corridors.

Table 6: *Appraisal of Route Options potential impacts*

Potential Impact Type/Level	Option 1	Option 2	Option 3	Option 4	Option 5
Direct Significant	None	None	None	None	None
Direct Moderate to Significant	None	None	None	None	None
Direct Moderate	None	None	None	None	None
Direct Slight	Four	None	Four	Two	Two
Indirect Significant	None	None	None	None	None
Indirect Moderate	None	None	None	None	None
Indirect Slight	None	None	None	None	None

The potential for negative impacts on previously unrecorded sub-surface archaeology, particularly within greenfield areas and within historic towns exists on all routes. This potential impact is mitigatable through programmes of preconstruction archaeological survey and investigation and where warranted, preservation of deposits *in situ,* micro-routing or archaeological excavation and recording.

The routes with the lowest potential for impact on recorded cultural heritage features and potential sub-surface archaeology are those that follow the alignment of existing roads, pathways, and railway embankments, for example Route 2. However, other routes (such as Routes 3, 4 and 5) would bring potential cyclists into close contact with higher numbers of significant cultural heritage sites. Cultural heritage can be an important draw, providing visual and cultural amenity. The proposed greenway should provide accessibility to and awareness of the richness of the historic environment of the western portions of County Westmeath, East County Roscommon, and South County Galway.

The following table ranks the routes from most to least preferred and contains a summary of the rational for this ranking:

Table 7: *Cultural heritage ranking of Route Options*

Ranking	Route no.	Reasoning
1	Route 4, Route 5	The Consultation Area for Route 4 contains a potential direct negative impact on landscapes of Portumna Demesne and Earlspark high medieval deerpark and its associated archaeological landscape (CH4724-CH4732, CH4736-CH4739), while the Consultation Area for Route 5 contains a potential direct negative impact on the landscapes of Portumna Demesne and Kilcolgan Castle. However, Routes 4 and 5 connect with Shannonbridge allowing access to Clonmacnoise and both routes pass through Portumna, which contains a number of significant cultural heritage sites, providing access to these and to Lough Derg. Route 4 also connects with Loughrea and Athenry, a unique town in an Irish context. Conversely, Route 5 connects with Kinvara (allowing access to the Wild Atlantic Way) and a number of towns and villages, including Gort, Kilcolgan and Clarinbridge that contain features of cultural heritage amenity value. In addition, this route connects with Thoor Ballylee and Coole Park as well as the karst landscape of South Galway
2	Route 3	Route 3 contains a large number of significant cultural heritage sites, including Kilconnell Abbey, the Battle of Aughrim site and Athenry. However, this route also contains a potential direct negative impact on Ballinasloe Canal (CH0350), as well as the landscapes of Garbally Demesne, Woodlawn Demesne, and the Battlefield of Aughrim
3	Route 1	Route 1 includes fewer significant cultural heritage sites than Routes 3, 4, and 5, however it does include Athenry, which contains perhaps the most significant group of cultural heritage features in the study area. This route also contains a potential direct negative impact on Ballinasloe Canal (CH0350) and the landscapes of Garbally Demesne, Mountbellew Demesne and Monivea Demesne
4	Route 2	This route contains the fewest significant cultural heritage sites and although this will mean a lower potential to negatively impact on such sites, this route also provides the lowest potential for cycleway users to appreciate cultural heritage

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Appendix 1: Photographic record

Plate 1: *Railway bridge (NIAH 15004129) across the River Shannon at Athlone*

Plate 2: *Locomotive Shed (CH9120) at Athlone, facing north*

Plate 3: *Water tower (CH9123) at Athlone, facing west*

Plate 4: *Bridge (CH9024) at Athlone, facing northeast*

Plate 5: *View from bridge (CH9024) at Athlone, facing south*

Plate 6: *View from bridge (CH9024) at Athlone, facing north*

Plate 7: *Lock keeper's house (CH9093), a feature associated with canal infrastructure in Athlone*

Plate 8: *Athlone Castle (CH9097), facing northwest*

Plate 9: *St Peter and Paul's Roman Catholic church (CH9026) with the Luan Gallery (CH9025) on the right in Athlone, facing northwest*

Plate 10: *Shannonbridge (CH9226, CH7804) and crane (CH9246) with Tete-de-Pont (CH7803) in background, facing west*

Plate 11: *Tete-de-Pont Bastioned Fort, Shannonbridge (CH7803)*

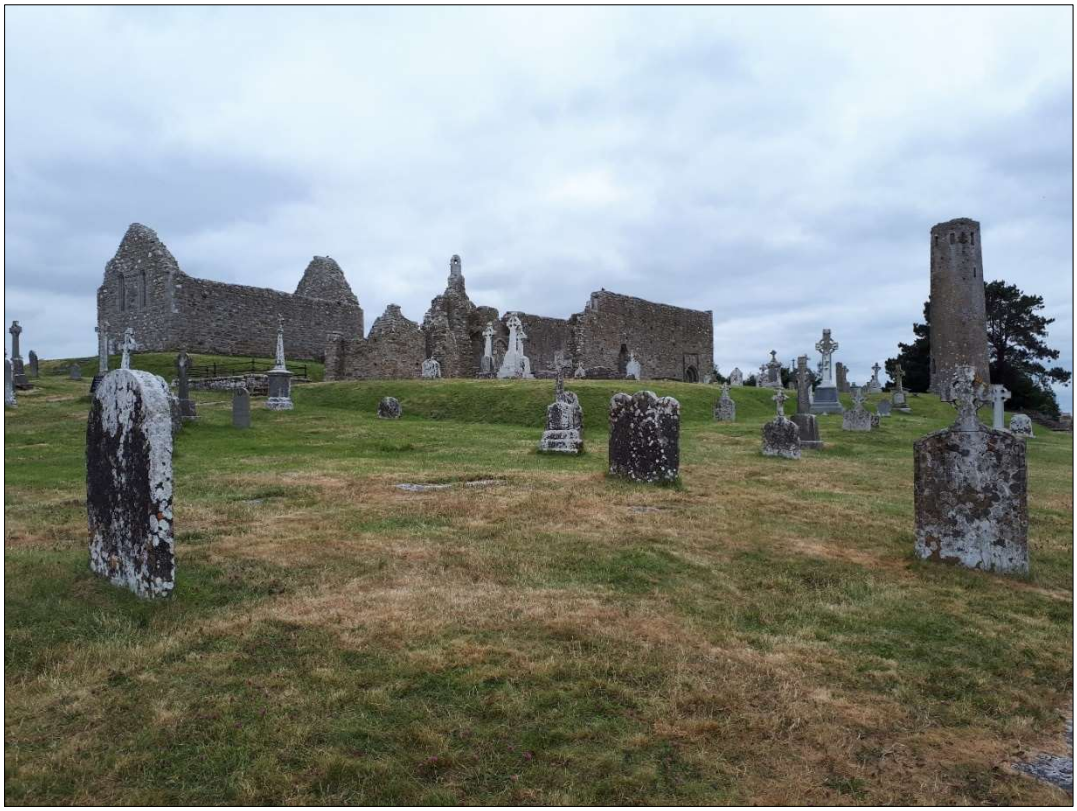

Plate 12: *View of part of Clonmacnoise*

Plate 13: *Clonfert House (CH3355). Although in a derelict condition, this is a rare example of a seventeenth-century Church of Ireland Bishop's Palace*

Plate 14: *St Brendan's Cathedral Clonfert (CH5211), facing north. The doorway is one of the finest examples of Hiberno-Romanesque architecture in Ireland*

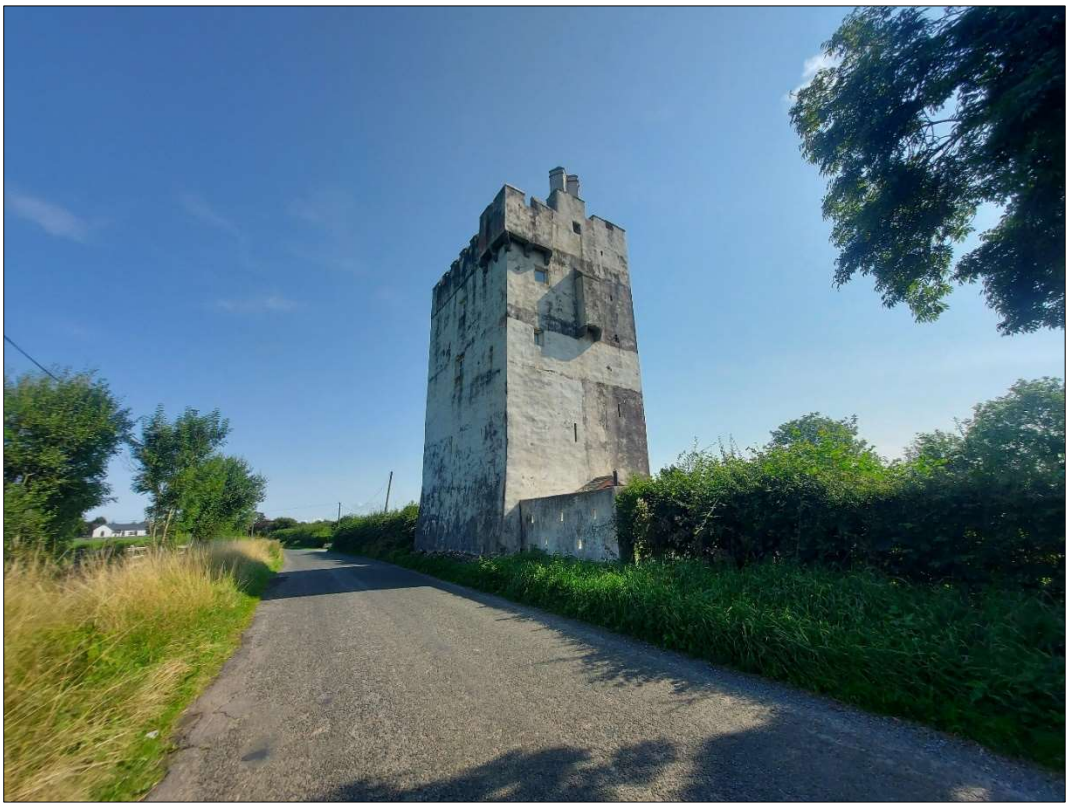

Plate 15: *Cloonkea Castle CH3585 (Clonfert), facing southwest*

Plate 16: *Connaught Harbour (CH0802) near Portumna. This is a well-preserved example of one of the harbours built on the River Shannon in the late eighteenth century to service freight and passenger traffic. From here passengers were transferred to the large lake steamers on Lough Derg*

Plate 17: *Portumna Castle (CH7737), facing west*

Plate 18*: Portumna Castle (Source: Lawrence Photographic Collection 1880-1900 -* [*https://www.nli.ie/digital-photographs.aspx*](https://www.nli.ie/digital-photographs.aspx)*)*

Plate 19: *View of crannogs on Lough Rea, facing west-northwest from the R351 Woodford Road*

Plate 20: *View of the marina to the south of Barrack Street Loughrea with crannogs in background, facing southeast*

Plate 21: *St Brendan's Cathedral and sixteenth-century town gate, facing west along Barrack street*

Plate 22: *View of the remains of the northern section of the town moat, facing east from 'The Walks'*

Plate 23: *View of the remains of Loughrea Priory (left) and the complex of nineteenth-century buildings associated with Carmelite Monastery (right), facing northwest from 'The Walks'*

Plate 24: *Loughrea Courthouse (CH2021), an example of one of a number of nineteenth-century municipal buildings in Loughrea that contribute to the town's streetscape*

Plate 25: *Kilconnell Friary (CH0019), facing northeast*

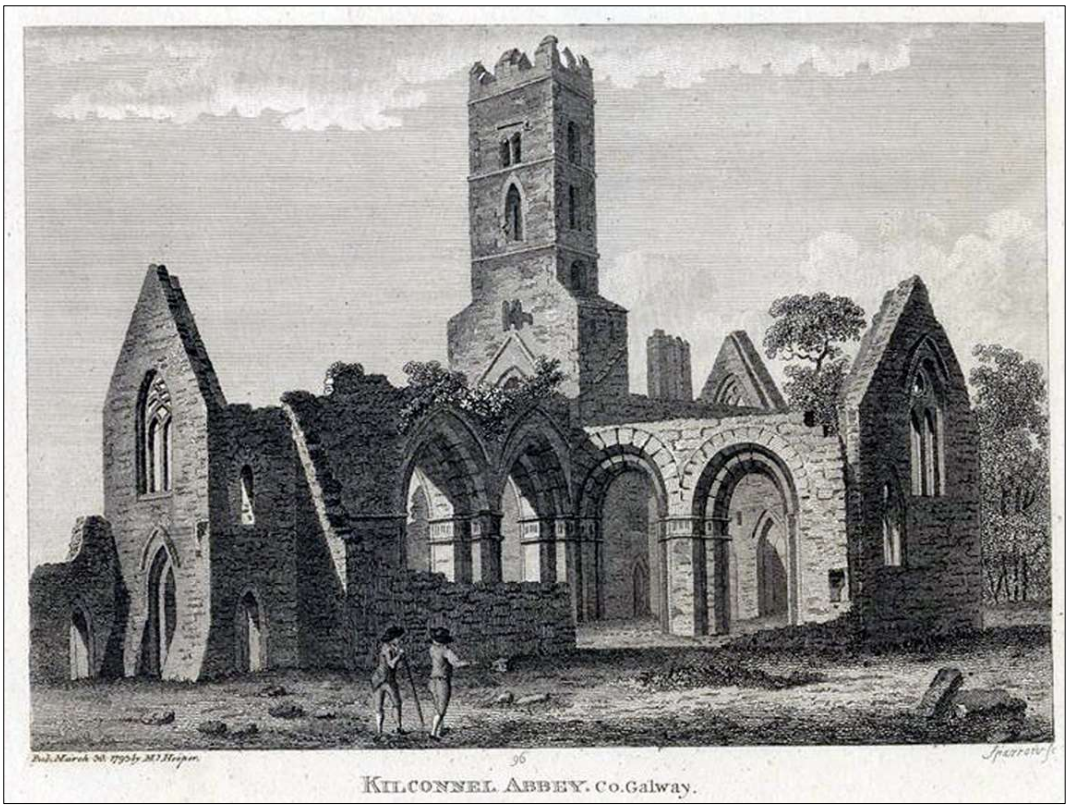

Plate 26: *Kilconnell Friary (CH0019) in 1791 (Grose & Ledwich 1791)*

Plate 27: *The Battle of Aughrim Visitor Centre and roadside signage for the battle site and other cycle and walking routes around Aughrim*

Plate 28: *One of the roadside Battle of Aughrim storyboards with Aughrim Castle in the background*

Plate 29: *View of roadside stile and storyboard detailing the Battle of Aughrim, with ringfort CH0583 in background*

Plate 30: *Ringfort CH0583, facing east. This was the command centre for Lieutenant General St Ruth's forces. It is also believed by Harbison (1975) to have been the place where St Ruth was killed during the Battle of Aughrim*

Plate 31: *View northeast across the battle site landscape from Aughrim Hill*

Plate 32: *View of part of Mountbellew House (CH7356), facing north*

Plate 33: *St Marys Church Mountbellew (CH7357), facing southwest*

Plate 34: *Ffrench Mausoleum Monivea (CH7314), facing east*

Plate 35: *Church of Ireland church Monivea (CH5252), facing southwest*

Plate 36: *Athenry Heritage Centre (former church) (CH0476 & CH0483). Medieval church with its tracery windows in the foreground and Victorian church in the background*

Plate 37: *Market Cross, Athenry (CH481), facing northeast*

Plate 38: *Athenry Dominican Priory (CH0475)*

Plate 39: *Athenry Castle (CH0472), facing northeast*

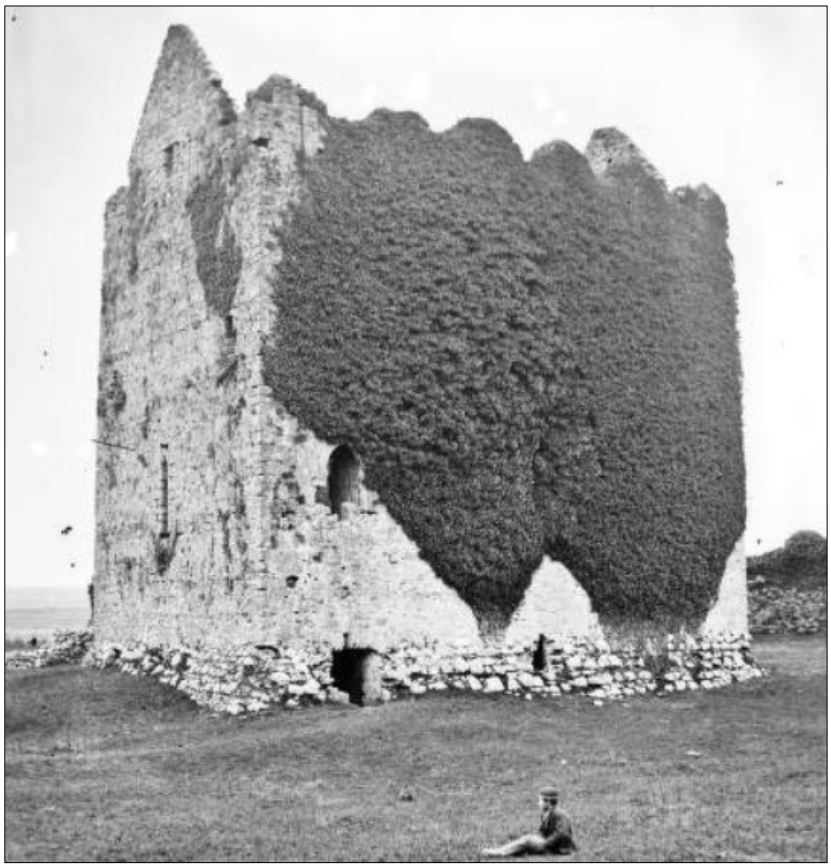

Plate 40*: Athenry Castle (Source: The Stereo Paris Photographic Collection 1860-1883 - https://www.nli.ie/digital-photographs.aspx)*

***Plate 41**: Athenry town wall and southeast corner tower from the R347 road*

***Plate 42**: View northwest from the R347 road showing Anglo-Norman castle (CH0472), Dominican Priory (CH0475) and Heritage Centre (former church) (CH0476 & CH0483)*

Plate 43: *Footbridge (CH1892), Athenry Station, facing west*

Plate 44*: Athenry Railway Station (Source: O'Dea Photographic Collection 1910-1992 https://www.nli.ie/digital-photographs.aspx)*

Plate 45: *North Gate (CH0474) Athenry, a surviving portion of the town defences*

Plate 46: *St Cuan's Church, Ahascragh (CH0128), facing west*

Plate 47: *Milverton House (CH0130), one of a small number of structures that evoke the late eighteenth-century/ nineteenth-century development of the village of Ahascragh*

Plate 48: *Meelick Church (CH5016) and its associated ecclesiastical features CH5017- CH5041, facing east*

Plate 49: *Drumacoo Church (CH4606), with its finely carved south doorway. The site contains a number of associated features, including a holy well dedicated to St Sourney*

Plate 50: *St Sourney's Well (CH4609), Drumacoo is still venerated*

Plate 51: *Yeats' Tower and thatched house at Ballylee (CH1237 & CH1236). This site was the summer residence of W. B. Yates, Nobel Laureate for poetry and now houses an interpretive centre and studio run by the Yeats Thoor Ballylee Society*

Plate 52: *Kiltartan School (CH6232), now Kiltartan Gregory Museum*

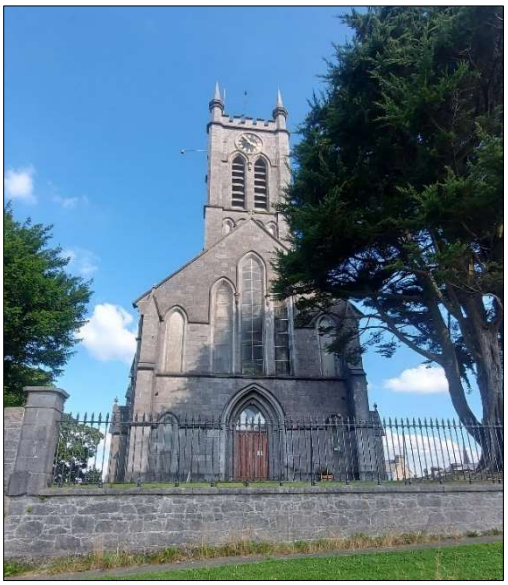

Plate 53: *St John the Evangelist Church of Ireland church (CH8587), Ballinasloe*

Plate 54: *Sisters of Mercy Convent Chapel (CH0365), Ballinasloe*

Plate 55: *Presbyterian Church (CH8593), Ballinasloe*

Plate 56: *Le Poer Trench Memorial (CH4705), Ballinasloe*

Plate 57: *Garbally House (Colláiste Sheosamh Naofa) (CH5093), a Country House built in 1819 and converted to a secondary school in 1922*

Plate 58*: Garbally House (Source: Lawrence Photographic Collection 1865-1914 - https://www.nli.ie/digital-photographs.aspx)*

Plate 59: *Woodlawn Church of Ireland church (CH5817), facing southeast*

Plate 60: *Killaan House, Woodlawn (CH1815), a late nineteenth-century Arts and Crafts influenced house*

Plate 61: *Woodlawn signal station (CH2798), part of a group of railway buildings including the station, platform and offices forming a complex of mid and late nineteenth-century railway architecture*

Plate 62: *Icehouse (CH8798) and Woodlawn Demesne landscape, facing south*

Plate 63: *View of mid nineteenth-century folly-type gatelodge (CH8806), an important structure associated with Woodlawn Demesne*

Plate 64: *View of road-over-railway bridge (CH0601) at Attymon, part of mid and late nineteenth-century railway heritage in County Galway*

Plate 65: *Oranmore Library (CH7608) (former Roman Catholic church), facing east*

Plate 66: *Oranmore Castle (CH7599), facing west*

Appendix 2: Cultural Heritage Inventory

Inventory of significant Cultural Heritage features and landscape elements

The following is an inventory of the significant Cultural Heritage features and landscape elements located within or directly adjacent to the study areas associated with the five route options. The sites chosen for this inventory includes features that are significant individually or have value as part of an interrelated group and sites and features that may act as potential cultural heritage landmarks along the cycle route. Many of the sites chosen are significant by virtue of being multi-designation features (*e.g*. features recorded in both archaeological and architectural inventories), protected structures and National Monuments, though some are single designation sites that contribute to townscape (*e.g*. as a significant part of an Architectural Conservation Area) or as part of a group of related sites that form a significant landscape. The sites chosen, which date for main part from the early medieval period to the twentieth century reflect the existing historic environment within the route options. The following is not an exhaustive list of surviving cultural heritage features. Sites have been picked to include variety where possible and indicate the strong late and post-medieval architectural survival, industrial heritage, railway heritage, early medieval rural settlement landscapes, demesne landscapes and features related to townscapes.

Related sites are presented in contiguous coloured blocks of alternating blue and green shading. Descriptions for the cultural heritage sites were extracted from the National Inventory of Architectural Heritage (NIAH), Archaeological Survey of Ireland (ASI) and the Archaeological Inventory of County Galway (Alcock *et al*. 1999).

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH9024	Shannon Road Bridge	Athlone, Athlone and Bigmeadow	Westmeath		15000010	4	603864	741516	Four-arch Italianate-style road bridge over River Shannon, built between 1841-4	1, 3, 4, 5
CH9026	SS Peter and Paul's Roman Catholic church	Ranelagh	Westmeath		15000012	6	603741	741535	Detached three-bay double-height Roman Catholic church, built between 1932-9, having copper-plated pitched roofs, a copper dome and with twin towers with clock faces flanking the pedimented entrance façade (south)	3, 4, 5
CH9025	Athlone Public Library	Ranelagh	Westmeath		15000011	5	603799	701919	Detached five-bay single-storey over basement former temperance hall, built	3, 4, 5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									in 1897, having a projecting single-bay gable-fronted entrance porch (later addition) to the north end of the main façade (west) and a single-storey extension attached to the south end. Later in use as a cinema (c. 1920 until 1940), a town hall (c. 1948 until 1979), and as a library (c. 1948 until 2004). Now municipal visual arts gallery	
CH9093	Shannon Navigation House	Athlone and Bigmeadow	Westmeath		15000344	66	603919	741332	Detached three-bay two-storey harbour master's house, built c.1900, now in use as private residence	1, 3, 4, 5
CH9097	Athlone Castle	Athlone and Bigmeadow	Westmeath	WM029-042002-	15000352	70	603803	741448	Freestanding Norman castle, built c.1210, largely rebuilt by British Army between c.1800-1827. In military ownership until 1970, now in use as a museum	1, 3, 4, 5
CH9108	2-7 Batteries Athlone	Bellaugh	Westmeath		15001072	81	602819	741568	Remains of extensive series of ramparts and batteries built by the British Army, c.1800	1, 3, 4, 5
N/A	Shannon Railway Bridge	Athlone and Ranelagh	Westmeath		15004129	96	203649	241879	Six-span wrought-iron railway bridge, built c.1850, resting on six pairs of iron Doric shafts, with the two widest spans over the river having latticed elliptical girders. The piers at either end are constructed of rusticated limestone	Near 2
CH9120	West Station	Ranelagh	Westmeath		15004143	101	603232	741778	Detached ten-bay single-storey engine shed, built c.1858	2, 3, 4, 5
CH9123	West Station	Ranelagh	Westmeath		15004150	104	603511	741867	Detached Italianate-style three-storey water tower, c.1851	2

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH0350	Ballinasloe Canal	Ardnasillagh, Carnmore East	Galway	GA101-007---	30410027 30410003		592329	724013	Ballinasloe Line of the Grand Canal, built between 1824 and 1828. Much of the canal has been filled in and is in use as an access track into peatland	1, 3
CH8587	Saint John the Evangelist Church of Ireland	Townparks (Clonmacnowen By. - Ballinasloe)	Galway	GA088-029----	30333049	204	585078	731110	Freestanding cruciform-plan Church of Ireland church, built 1842-3, and rebuilt following fire in 1899. Set on the site of an earlier church	1, 3
CH8593	Presbyterian Church	Townparks (Clonmacnowen By. - Ballinasloe)	Galway	GA088-037----	30333044		585083	731158	Freestanding gable-fronted limestone Presbyterian church, dated 1845	1, 3
CH8586	Saint Michael's Church	Townparks (Clonmacnowen By. - Ballinasloe)	Galway	GA088-028002-	30333062	184	585333	701919	Freestanding gable-fronted Roman Catholic church, built 1852-8, of limestone, with six-bay nave elevation having clerestory, lean-to side aisles, five-stage square-plan tower to west corner of front elevation with octagonal-plan spire, corner buttresses, lower canted chancel with hipped roof to south-east end, three-bay sacristy to south-west of chancel, and gabled entrance porch to north end of south-west elevation	1, 3
CH0365	Sisters of Mercy Convent Chapel	Ardour	Galway		30333013	213	584915	731260	Attached Gothic Revival gable-fronted convent chapel, built 1864, built of limestone and having six-bay west side elevation, and three-stage square-profile tower with spire to south-east corner	1, 3

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH4705	Le Poer Trench Memorial	Dunlo	Galway	GA087-066----	30333055	228	584808	730958	Freestanding carved limestone open-sided monument, erected 1840 in honour of Charles Le Poer Trench, Archdeacon of Ardagh and a member of the Trench family of Garbally	1, 3
CH5093	Coláiste Sheosamh Naofa	Garbally Demesne	Galway	GA087-074----	30408714		583384	730438	Detached two-storey over basement country house, built 1819, having two internal courtyards, renovated and courtyards filled in c.1850	1, 3
CH0128	Saint Cuan's Church	Ahascragh West	Galway	GA061-013----	30406115	93	577877	738521	Gothic Revival church, built c.1800 and altered in the 1830s and 1890s	1
CH0130	Milverton House	Ahascragh West	Galway	GA061-014----	30406119		577631	738578	Detached three-bay three-storey house, built c.1800	1
CH7064	Lowville House	Lowville	Galway	GA074-084----	30407402	3951	577243	701919	Detached seven-bay two-storey house, built c.1780, now derelict, having multiple-bay two-storey block to west. Shallow hipped natural slate roof with rendered chimneystacks, and cast-iron rain water goods	1
CH0133	Ahascragh Bridge	Ahascragh West, Ballinphuill (Ed Grange)	Galway		30406118	91	577470	738422	Six-arch limestone road bridge, built c.1780, over Ahascragh River, with two river arches. Segmental arches having tooled voussoirs to arch rings, and coursed random rubble limestone to wall	1
CH0125	Ahascragh Mills	Ahascragh West	Galway	GA061-010----	30406120	92	577647	738603	Corn mill complex, built c.1810, now derelict. Comprising single, two and three-storey buildings gathered around multiple-bay four-storey mill building. Main building has pitched corrugated-	1

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									iron roof and coursed squared limestone walls, square-headed vent openings to top floor with stone sills and lintels, oculus opening to centre of south-east elevation	
CH0127	Saint Catherine's Church	Ahascragh West	Galway	GA061-012----	30406111	94	578206	738799	Freestanding cruciform-plan Church of Ireland church, built c.1815, having five-bay nave, single-bay transepts and chancel, latter with lean-to porch to south side, and vestry at south-east at junction of nave and transept and having chamfered corner, and with three-stage bell tower to west. Pitched natural slate roof with stone copings to skew gables, moulded stone cornice, and cast-iron rainwater goods	1
CH2377		Caltra	Galway	GA060-025----			571317	701919	On a hillock in grassland. Poorly preserved subcircular rath (E-W 34m, N-S 29m) defined by a degraded scarp and external fosse.	1
CH2382	Saint Solan's Church	Caltra	Galway	GA060-027----, GA060-027001-	30406004	3159	571083	701919	Freestanding gable-fronted Roman Catholic Church, built c.1840, having six-bay nave, side aisles added 1938-9, three-stage bell tower to west end of nave, entrance porch to north elevation, and late twentieth-century single-storey extension to north. Pitched natural slate roof, stone copings to gables, skew corbels to west, later parapets to side aisles	1
CH3066		Castleblakeney	Galway	GA060-041----, GA060-041001-	30406005	89	568496	701919	Freestanding single-cell Church of Ireland church, built c.1810, having	1

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									three-bay nave, three-stage bell tower to west, and lean-to vestry to east gable. Now in use as library and heritage centre. Pitched slate roof with cut-stone chimneystack to east gable, and replacement uPVC rainwater goods	
CH5252	Monivea Church of Ireland	Glennagloghaun South	Galway	GA071-038----	30407107	112	553319	736214	Detached three-stage square-plan bell tower, dated 1759, remaining part of otherwise demolished Church of Ireland church	1
CH7314	Ffrench Mausoleum	Monivea Demesne	Galway	GA071-067----	30407110	114	554240	736025	Freestanding mausoleum with crypt, dated 1897	1
CH7356	Mount Bellew Museum	Mountbellew Demesne	Galway	GA046-068----	30404617	3152	566176	746520	Mountbellew Demesne – Country House and associated walled garden, etc.	1
CH7357	Saint Mary's Church	Mountbellew Demesne	Galway	GA046-070----	30404620	62	567223	746434	Freestanding Gothic Revival Roman Catholic Church, built c.1880. Set within the site of an earlier church and graveyard	1
CH0449	Mountbellew Bridge	Ashbrook, Ballymaglancy, Barnwellsgrove	Galway		30404614	3149	566684	746801	Five-arch road bridge, built c.1810, over Castlegar River. Round arches with cut limestone voussoirs to arch rings, gunnelling to soffits, coursed random rubble limestone to spandrels. Triangular cutwaters to south face with triangular ashlar piers with circular pipe cut through upper section of cutwater. Carved limestone milestone, made c.1760, set into parapet of Mountbellew Bridge (reg. no. **30404610)**	1

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH0019	Kilconnell Abbey	Abbeyfield	Galway	GA086-001----			573299	731457	The well-preserved remains of the friary comprise a 15th-century nave and chancel church along with part of the cloister and domestic ranges to the N. The S aisle and S transept, which open off the nave and chancel respectively, are probably late 15th-century additions as is the centrally placed three-storey tower	3
CH1005		Ballydavid Middle, Ballyluoge	Galway		30408404	3747	550257	730701	Single-arch railway bridge, built c.1860, carrying Athenry to Tuam Railway line over road. Segmental arch having rusticated limestone voussoirs, snecked limestone walls and abutments, curved coping stones to abutments. Tooled limestone copings to parapets	1
CH2515		Caraun (Ed Belleville)	Galway		30407114	3745	549643	701919	Single-arch limestone road bridge, built c.1860, over disused Athenry to Claremorris railway line. Symmetrical plan about north-south axis. Coursed squared and snecked rubble stone rising uninterrupted to parapets with squared and perpendicular snecked rubble stone flanking walls with round-headed coping stones to east and west. Segmental arch with cut-stone voussoirs to arch rings. Squared and snecked stone to spandrel panels with flat coping stones to parapets. Metal railings from end of bridge to adjoining fields	1

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CH3336	Clonbrock House	Clonbrock Demesne	Galway	GA060-056----	30406012		574550	739440	Detached eight-bay three-storey over basement country house, built c.1790, now ruined, having square plan with three-bay pedimented breakfront, Doric entrance porch added c.1824, three-storey over basement single-bay extension with parapet roof and brick cornice to north-west, single-storey bow-ended wing to south-east added c.1855, and two-storey wing to north-west. Ruled and lined lime rendered façade. Porch, accessed by four stone steps, has carved stone entablature with triglyph and metope detail and moulded cornice with dentils above, supported on four fluted Doric columns	1
CH0472	Athenry Castle	Athenry	Galway	GA084-001006-			550384	728021	Anglo-Norman masonry castle, built by Meiler de Bermingham between 1235 and 1240 and it occupies a slight rise that controlled a ford over the River Clareen	3, 4
CH0475	Athenry Abbey	Athenry	Galway	GA084-001014-			550373	727809	Dominican priory, dedicated to Saints Peter and Paul, founded in 1241 by Meiler de Birmingham. This site also contains numerous associated recorded monuments, including graveslabs and wall monuments	3, 4
CH0481	Market Cross	Athenry	Galway	GA084-001020-	30332020	3975	550248	727906	Freestanding limestone cross, erected c.1810, with late medieval socket stone with carved animals, and carved lantern cross of c.1475	3, 4

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH0474		Athenry	Galway	GA084-001001-			550182	727739	North Gate, part of the medieval town defences visible particularly to the southeast and southwest of the town	3, 4
CH0476 & CH0483	Athenry Heritage Centre	Athenry	Galway	GA084-001015-	30332017	140	550277	727963	Freestanding limestone former Church of Ireland Church, dated 1828, with three-bay nave elevation, gabled apse flanked by gabled chapels to east end, three-stage square-plan tower to west end with shallow gabled projections to north, south and west sides, with roofless remains of thirteenth-century church projecting from same sides. Now in use as heritage centre	3, 4
CH0541	Athenry House	Athenry	Galway		30332038	131	550174	727578	Detached five-bay two-storey country house, built c.1780, facing east and having shallow pedimented breakfront, and flanked by slightly recessed and slightly lower single-bay two-storey wings of c.1820. Rear elevation has three bays to main block, and projecting pedimented middle bay. Pitched slate roof with rendered end chimneystacks, and limestone eaves course and pediment with roundel. Hipped slate roofs to wings. Rendered walls. Square-headed windows, currently boarded up but one tripartite timber sliding sash window visible, with limestone sills. Round-headed window to first floor of rear pedimented bay, and fenestration to wings is irregular. Round-headed doorway with block-and-start surround	3, 4

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									and triple keystone, and flanked by sidelights, openings currently boarded up. Single-storey outbuilding to west having pitched roof lacking covering, rubble limestone walls and square-headed door and window openings and one elliptical carriage arch	
CH1888	Athenry Railway Station	Brackernagh (Persse)	Galway		30332015	134	549994	728066	Detached single-storey cruciform-plan railway crossing keeper's house, built 1851	1, 2, 3, 4
CH1889	Athenry Railway Station	Brackernagh (Persse)	Galway		30332013	135	549986	728092	Detached ten-bay single-storey goods shed, c.1850	1, 2, 3, 4
CH1890	Athenry Railway Station	Brackernagh (Persse)	Galway		30332016	136	550067	728120	Detached three-bay two-storey L-plan station master’s house, built 1851	1, 2, 3, 4
CH1891	ADC House	Brackernagh (Persse)	Galway		30332009	137	550076	728174	Detached seven-bay single-storey former railway station, built 1851	1, 2, 3, 4
CH1892	Athenry Railway Station	Brackernagh (Persse)	Galway		30332010	138	550121	728203	Freestanding single-span cast-iron foot bridge over railway track, erected 1851	1, 2, 3, 4
CH8798	Woodlawn	Woodlawn	Galway	GA086-243----	30408604		568031	730782	Freestanding circular-plan domed icehouse, built c.1780	3
CH8806	Woodlawn	Woodlawn	Galway	GA086-251----	30408612	162	568749	729632	Detached single-bay three-storey tower house-style gate lodge, built c.1850	3
CH2797	Woodlawn Railway Station	Carrowmore (Ed Killaan)	Galway		30407320	122	568610	701919	Freestanding Tudor Revival-style limestone-built railway station, built 1851, comprising three-bay two-storey station master's house with single-storey stationhouse at right angles and	3

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									slightly projecting to platform, latter building having three-bay elevation to platform and five-bay elevation to north elevation, and stationmaster's house having shallow two-storey entrance porch to east and slight entrance projection to south	
CH8796	Woodlawn House	Woodlawn	Galway	GA086-241----	30408603		567829	701919	Detached Palladian-style country house comprising three-bay three-storey central block built c.1760, having slightly advanced end bays and projecting tetrastyle Ionic portico to entrance bay, remodelled c.1860 and flanked by four-bay two-storey wings having projecting pedimented end bay to each wing. Now disused	3
CH5817	Woodlawn Church of Ireland Parish Church	Killaan	Galway	GA086-152----	30408607	156	568799	731241	Freestanding gable-fronted Church of Ireland church, dated 1874	3
CH1815	Killaan House	Kilaan	Galway		30408606		568755	731312	Detached complex-plan three-bay single- and two-storey Arts and Crafts influenced house, built c.1880	3
CH0600	Attymon Railway Station	Attimonmore South	Galway		30408504	145	559494	730307	Detached five-bay single-storey railway station, built c.1890	2, 3
CH0601		Attimonmore South	Galway		30408503	146	559437	730302	Single-arch limestone railway bridge, built 1851	2, 3
CH0564	Battle of Aughrim site	Attibrassil, Attidermot, Cloonameragaun,	Galway	GA087-127----			579450	726870	The site of the Battle of Aughrim, fought on 12th July 1691, extends over nine townlands in undulating farm and	3

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		Coololla, Foats or Levallynearl, Kilcommadan, Kinnaveelish, Tristaun, Urraghry							bogland to E and S of the village of Aughrim	
CH5447	Graigabbey House	Graigabbey South	Galway	GA084-083001-	30408405	129	553387	701919	Detached five-bay two-storey house, built c.1800, having recessed three-bay two-storey return to rear. Rear also has two-storey two-bay block with pitched roof to east side, single-bay two-storey flat-roofed extension to west side, and two-bay single-storey addition to centre. Hipped slate roof to main block, having clay ridge tiles with rendered chimneystacks and cast-iron rainwater goods	3
CH0583		Attidermot	Galway	GA087-004----			578857	727088	A sub-circular rath (E-W 39m, N-S 33m), in fair condition, defined by a bank. Traces of a possible external fosse survive from NW to N. A gap at E may be original	3
CH0585		Attidermot	Galway	GA087-006----			579191	727075	A sub-circular overgrown rath (N-S c. 48m, E-W c. 45m), in fair condition, defined by two banks and an intervening fosse. The fosse and outer bank are present from E through S to N, and a field bank overlies the outer bank from SW through W to N. A gap (Wth 5.5m) at E could be original	3
CH3409	Saint Catherine's Church	Cloonameragaun	Galway	GA087-053003-	30408721	167	578815	701919	Freestanding Roman Catholic church, dated 1860, built of limestone, and having four-bay nave elevation, slightly	3

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									lower chancel to east (road) end, gabled porch to west elevation, and square-profile two-stage tower to north elevation of chancel. Pitched slate roofs with cut-stone cross finials and copings, and cast-iron rainwater goods	
CH4756		Ellagh (Kilconnell By.)	Galway	GA086-106001-			574174	731872	Poorly preserved oval ringfort (E-W 67.7m, N-S 42.7m) defined by a bank of earth and stone from NNW through N to ESE, and elsewhere by a scarp	3
CH4763		Ellagh (Kilconnell By.), Lissard	Galway	GA073-081002-			574454	732035	Field system comprising a number of irregular fields are discernible, some with traces of cultivation ridges, but no coherent pattern is apparent	3
CH6890		Lissard	Galway	GA073-081001-			574859	732185	Well-preserved circular ringfort (D 43m) defined by two banks and an intervening fosse. There is a causewayed entrance (Wth 1.8m) at NE, stone-faced along SE side	3
CH6891		Lissard	Galway	GA073-081003-			574721	732032	Well-preserved circular ringfort (D 28m) defined by two banks and an intervening fosse. There is an entrance causeway (Wth 2m) at E	3
CH7803	Shannonbridge Tete-de-Pont	Raghrabeg	Roscommon	RO056-016----	31956005	5600028, 5600029	596395	725428	Tete-de-pont with glacis, redoubts and caponniere, constructed in 1810, with barracks added in 1814	4, 5
CH7804	Shannonbridge	Raghrabeg	Roscommon	RO056-018001-	31956004	5600028, 5600029	596614	725469	Sixteen-arch road bridge, completed in 1757, spanning the River Shannon	4, 5
CH9226	Shannon Bridge	Cloniffeen, Raghra	Offaly	OF013-037001-	14805011	14805011	596627	725478	Sixteen-arch masonry road bridge, completed in 1757	4, 5

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CH9246	Crane Number 10	Cloniffeen	Offaly		14805009	14805009	596700	725450	Cast-iron quay crane, erected c.1840	4, 5
CH3355	Clonfert House	Clonfert Demesne	Galway	GA101-008----	30410101	283	596105	721330	Detached two-storey former Church of Ireland bishop's palace with dormer attic, largely built c.1635 and extended in late eighteenth century, but also incorporating late sixteenth/early seventeenth-century house	4, 5
CH5211	Saint Brendan's Cathedral	Glebe (Part Of)	Galway	GA101-017001-	30410102	286	596099	721149	Clonfert is one of the oldest ecclesiastical sites in continuous use in Ireland. The cathedral contains elements dating to the twelfth, thirteenth, fifteenth and nineteenth centuries, charting the evolution of church design from the medieval to the modern periods	4, 5
CH3585	Brackloon Castle	Cloonkea	Galway	GA101-006----			594957	719043	Rectangular four-storey high tower house (8.4m N-E-SW; 6.7m), with a gentle base-batter in use as a private home and under conservation by the owners. This caste was in existence in 1557 when it was captured by the Lord Chief Justice. It is named ‘Brackloon Castle’ on historic cartographic depictions	4,5
CH5016	Saint Francis' Church	Friarsland	Galway	GA108-124001-	30410823	343	594287	713686	Freestanding gable-fronted Franciscan friary church, built c.1414, reroofed c.1855 for use as a parish church. . This site contains a number of associated features, including CH5017 (Water mill -	4

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									horizontal-wheeled), CH5018 (Earthwork), CH5019 (Chapel), CH5021 (Graveyard), CH5022 (House - indeterminate date), CH5020 and CH5023 - CH5040 (Graveslab), CH5041 (Stone head), CH5042 (Architectural fragment)	
CH5043		Friarsland	Galway	GA109-021----			594350	713819	Earthworks associated with ringwork castle. Possibly the site of the 13th-C de Burgo castle	4
CH7736		Portumna Demesne	Galway	GA127-019----			585423	703964	Dominican Friary originated a small 13th-century Cistercian chapel dedicated to Saints Peter and Paul, having apparently been abandoned, it was granted to the Dominicans by the O'Maddens sometime before 1414	4, 5
CH7737	Portumna Castle	Portumna Demesne	Galway	GA127-018----	30343048	473	585212	704026	Detached three-storey semi-fortified Jacobean house with raised basement and dormer attic, built c.1618, facing north and comprising rectangular block having four-bay long sides and three-bay short sides, flanked by square-plan projecting corner towers with one-bay sides. Circular-plan porch added to south (rear/garden) elevation c.1797. Building destroyed by fire c.1826, and subject to ongoing conservation	4, 5
CH4894	Palmerstown House	Fairyhill	Galway	GA127-004----	30343023	3766	586228	701919	Detached three-bay two-storey house, built c.1820, with shallow bowed central breakfront to front (east) elevation, and two-bay two-storey extension to west end of south elevation. Hipped slate	4, 5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									roof with paired cement rendered central chimneystacks, and cast-iron rainwater goods	
CH7733	Saint Brigid's Church (old)	Portumna	Galway	GA127-015----	30343011, 30343010	467	585197	701919	Freestanding T-plan Gothic Revival Roman Catholic church, built c.1825, with three-bay nave and wide single-bay transepts with gabled porches to east sides. Three-bay wide, one-bay deep and two-storey porch to front, built 1858, topped by square-plan tower drum. Later converted to parish hall and currently disused	4, 5
CH0802	Connacht Harbour	Ballintleva (Clare By), Carrownageeha	Galway		30412704	477	586487	704857	Harbour, built c.1810, on west bank of River Shannon. Dressed limestone retaining walls with sloping sides to entrance and cast-iron mooring bollards. Accessed by canal to north of Portumna Bridge	4, 5
CH2021	Loughrea Courthouse	Bunnahevelly More	Galway		30337009	1254	561564	716562	Detached three-bay two-storey courthouse, built 1821	4
CH7021	Saint Brendan's Cathedral	Loughrea	Galway	GA105-150014-	30337038		562132	716423	Freestanding cruciform-plan gable-fronted Roman Catholic cathedral, facing north and with altar at south end. Construction commenced in 1897 and was completed 1903	4
CH6954		Lough Rea	Galway	GA105-198----			561635	716398	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4
CH6955		Lough Rea	Galway	GA105-198001-			561820	716327	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4

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CH6956		Lough Rea	Galway	GA105-198002-			561747	716277	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4
CH6957		Lough Rea	Galway	GA105-198003-			561877	716316	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4
CH6958		Lough Rea	Galway	GA105-199----			562032	716142	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4
CH6959		Lough Rea	Galway	GA105-224----			561537	716410	One of a group of six Crannogs located close to the town of Loughrea. Likely dating to the early medieval period	4
CH6050		Killimor	Galway	GA085-056001-			560275	701919	The remains of a poorly preserved rectangular medieval church (E-W; L >16.2m, Wth 6.5m). Set on E bank of the Killimor River, wedged between a modern graveyard to N and a modern RC church to S.	4
CH6057	Killimor Castle	Killimor	Galway	GA085-057----	30408511	151	560315	701919	Detached three-bay two-storey house over raised basement, western two-thirds being three storeys of formerly four-storey medieval tower house of c.1500, and eastern bay and second-phase fenestration of whole being of c.1725. Final and current fenestration inserted nineteenth century when five bays of second phase became three bays	4
CH1184	Gort Library	Ballyhugh	Galway	GA122-006---	30341042	433	545044	701934	Freestanding cruciform-plan limestone former Church of Ireland church, built	5

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									c.1810, with two-bay nave, three-stage tower to west gable, full-height transepts, and lower chancel to east elevation, with crenellated canted porch to north re-entrant corner of chancel and nave and similar annex to south. Now in use as library	
CH1186	Saint Colman's Church	Ballyhugh	Galway	GA122-008----	30341030	417	545031	701919	Freestanding cruciform-plan gable-fronted Roman Catholic church, built 1825. Canted chancel, and sacristy added 1876. Building altered and extended 1892, and substantially altered again c.1935 with side aisles added. Three-bay nave elevation with clerestorey and lean-to side aisles, full-height single-bay transepts, four-stage tower to north-west corner with steeple, and single-bay two-storey annex to front elevation and apse, sacristy and extension to south elevation	5
CH1197	Críost Rí	Ballyhugh	Galway		30341016	3452	545083	701919	Freestanding monument, erected c.1930, comprising life-size sculpted marble figure of Christ the King on carved square-profile tapering limestone pedestal with inscription and having carved celtic interlace panels to base and below statue, and 'Críost Rí' to front panel. Set on octagonal cut limestone plinth with planting around and bounded by decorative wrought-iron railings and gate with cut limestone plinth	5

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CH0733	Gort Court House	Ballinloughaun	Galway		30341018		545108	702167	Attached three-bay two-storey court house, built c.1815, with shallow breakfront to first floor, and arcade detailing to ground floor	5
CH6231		Kiltartan	Galway	GA122-105----	30412202		545142	705839	Freestanding cruciform-plan Roman Catholic church, dated 1842, having two-bay nave, single-bay transepts, shallow single-bay chancel (to west end), recent sacristy to west gable, and recent gabled porch to south elevation	5
CH6232		Kiltartan	Galway	GA122-106----	30412203		545392	705731	Detached four-bay single-storey national school, dated 1892, facing south, and comprising two-bay main block, with two-bay slightly recessed block to east end, latter fronted by arcaded loggia. Now in use as museum	5
CH1430		Ballynakill (Ballymoe By)	Galway		30412206		543864	705016	Courtyard of outbuildings, built c.1785, comprising seven-bay two-storey middle block forming west side of cobbled yard, multiple-bay west block running east-west from north end of rear of middle block, and partly demolished seven-bay two-storey range forming east side of cobbled yard. Middle block has three-storey middle bay. Standing blocks now in use as tea rooms and visitor centre	Near 5
CH1431		Ballynakill (Ballymoe By)	Galway		30412205		543988	705291	Rectangular-plan walled garden, built c.1785. Random rubble limestone walls	Near 5
CH3788		Coole Demesne	Galway	GA122-052----	30412204		543819	705104	Surviving plinth of Coole Park, country house built c.1785, comprising squared coursed rubble limestone walling having	Near 5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									tooled quoins, remains of cut-stone plinth, and evidence for blocked-up openings	
CH1237 & CH1236	Thoor Ballylee Castle	Ballylee	Galway	GA123-019----	30412302		548101	706127	Five-bay single-storey vernacular house, built c.1800 (CH1236), attached to fifteenth-century tower house (CH1237). Both restored by W.B. Yeats in 1920 and now in use as a heritage centre/interpretative centre. Set beside Ballylee Bridge (CH0715) on the Ballylee River	5
CH7516		Newtown	Galway	GA123-077----			546644	706286	This large well-preserved circular enclosure (diam c. 97m) is defined by two banks and an intervening fosse best preserved at N. The outer bank is visible from NW through N to ESE. Associated features include: ringfort GA123-077---- (CH7517), souterrain GA123-078---- (CH7518), ringfort GA123-078001- (CH7519) and children's burial ground GA123-079---- (CH8011)	5
CH4697	Dunguaire Castle	Dungory West	Galway	GA113-124----			538031	710585	Tower house built in 1520 by the O'Hynes	5
CH2666	Dungora Cottage	Carrowbeg South (Ed Liscananaun	Galway		30339019		537726	710367		5
CH6311		Kinvarra (Kiltartan By.)	Galway	GA113-139----		4506	537315	701919	On a wooded hillock overlooking Kinvarra Bay to the N and now completely enclosed by modern houses and business premises. This fairly well-preserved medieval church (c. 17m E-W; c. 7.8m N-S), dedicated to St.	5

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									Coman, is roughly centrally located within an associated graveyard (GA113-139002-)	
CH2250		Cahernagry	Galway		30339007		537322	701919	Irregular-plan harbour, constructed c.1800. Comprising two mooring quays having squared limestone walls with inset steps providing access to water, ending in concrete-paved slipway to east and cobble-paved pier to west. Cast-iron bollards and concrete wall to pier. Painted stone bollards to harbour walls	5
CH4606	Drumacoo ecclesiastical site	Drumacoo	Galway	GA103-118001-			539543	716852	Multiperiod church - part of the important early monastic site associated with St Sorney. This site also includes associated features: CH4607 (Graveyard), CH4608 (St George Mausoleum), CH4609 (Ritual site - holy well), CH4610 (Building), CH4611 (Bullaun stone), CH4612 (Cross), CH4613 (Settlement cluster), CH4614 (Road - road/trackway), CH4615 (Cairn - unclassified), CH4616 (Cross-slab), CH4617 (Leacht)	5
CH5693 & CH5698	Kilcolgan Castle	Kilcolgan	Galway	GA103-128008-, GA103-128001-	30410333		541191	718001	Detached Gothic Revival country house, built 1801, comprising three-storey tower with two-bay elevations - possibly being remodelling of medieval tower house -, with single-storey entrance block to front, flanked by advanced and similarly detailed single-storey blocks	5

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CH2745	Kilcornan House	Carrowmanagh (Tiaquin By)	Galway		30335013		541353	701919	Detached E-plan country house, built 1838 with two storeys over raised basement. Further floor and flat roof added c.1970. Now in use as healthcare institution. East (entrance) and west elevations are five bays and have projecting tower-like middle bay with stepped corner buttresses, that to entrance elevation being fronted by canted oriel window and square-plan porch with fluted octagonal corner turrets having rendered openwork parapet, and with bartizan feature to each corner at original roof level	5
CH1434	Paddy Burke's Pub	Ballynakill (Leitrim By)	Galway		30335007		541182	701919	End-of-terrace two-storey thatched public house, built c.1850, incorporating several separate buildings, having eleven-bay ground floor and seven-bay first floor, and having single-storey bay to south. Recent six-bay single-storey extension perpendicular to rear (west) elevation. Pitched thatched roofs with rendered chimneystacks	5
CH4139		Cregganna More	Galway	GA095-020002-			539883	701919	It consists of a circular enclosure (diam. 128m) defined by a double-faced drystone wall. From NW through N to E only the inner wall-facing survives. From E to SE a curving field wall indicates the former line of the enclosing element. The wall is best preserved from SW through W to NW. A gap (Wth 3m) at SSW may be the original entrance. The	5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									interior is subdivided by several later field walls, a number of which were removed in 2002 (Casey 2003, 30-33). An anchor is incised on a large stone (see GA095-020003-) on the outer wall-face at W. A church (GA095-020002-) lies within the interior and a cross-base (GA095-020004-) is also associated	
CH7599		Oran More	Galway	GA095-110----		241	537622	701919	Well-preserved tower house overlooking Galway Bay	1, 2, 3, 4, 5
CH7608	Oranmore Library	Oran More	Galway	GA095-114----	30409508	240	538002	701919	Freestanding cruciform-plan gable-fronted Roman Catholic church, dated 1803, with gabled bellcote added c.1885. Now in use as library. Two-bay nave elevation, and full-height single-bay transepts, full-height chancel to east, and bowed bays to re-entrant corners. Lean-to additions to north and south elevations of nave, and to east elevations of transepts	1, 2, 3, 4, 5
CH1623	Castle Pier	Barnaderg South	Galway		30409504		537587	701919	Rectangular-plan quay wall, built c.1780. Snecked squared limestone walls to lower level, coursed squared limestone walls to upper level, with batter. Integral steps to north elevation. Cast-iron mooring rings set in square recesses to north elevation. Boat slip to north with battered rubble stone walls and cut-stone copings giving access to water	1, 2, 3, 4, 5
CH1625	McDonagh	Barnaderg South	Galway		30409506	928	537997	701919	Attached seven-bay thatched public house, built c.1800, formerly two	1, 2, 3, 4, 5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
									number three-bay single-storey houses, that to south having dormer attic. Pitched thatched roof having raised decoratively scolloped ridge and low painted rendered chimneystacks. Painted smooth rendered walls. Square-headed window openings with painted stone sills, dormers having two-over-two pane timber sliding sash windows, and ground floor having enlarged openings with replacement timber windows. Square-headed door openings to each part, having recent timber-panelled door and half-glazed timber panelled door. Timber nameplate with painted lettering over south part. Building fronts onto street	
CH1626	Joseph Howley Monument	Barnaderg South	Galway		30409509	932	538026	701919	Freestanding carved limestone statue, dated 1947, commemorating Joseph Howley, set on stepped square-plan limestone plinth. Inscriptions to east face of plinth. Set behind rubble stone plinth wall with recent railings	1, 2, 3, 4, 5
CH7172		Merlinpark	Galway	GA094-023----			533441	725966	Tower House - 'Doughiske Castle' was in existence in 1574. It is currently under refurbishment	1, 2, 3, 4, 5
CH3479		Cloonburren	Roscommon	RO056-007002- (and RO056-005----, RO056-007001-,RO056-006001-, RO056-006002-,			596545	729282	Early ecclesiastical complex comprising a religious house - nunnery and associated graveyard (CH3478), holy well (CH3477), architectural fragment (CH3485), cross-slabs (CH3480, CH3486-CH3496), crosses (CH3476,	4, 5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
				RO056-007003-, RO056-007004-, RO056-007005-, RO056-007007-, RO056-007008-, RO056-007009-, RO056-007010-, RO056-007011-, RO056-007012-, RO056-007013-, RO056-007014-, RO056-007015-, RO056-007016-, RO056-007017-, RO056-007018- RO056-007019-, RO056-009001-, RO056-009---- ,RO056-011002)					CH3481, CH3484), wayside crosses (CH3475, CH3482), Graveslab (CH3501) and road/trackway (CH3503).	
CH3499		Cloonburren	Roscommon	RO056-010001-			597026	728760	Motte and bailey castle located to the north of the Esker Riada. Consisting of a flat-topped, grass-covered gravel mound with an associated fosse and outer bank. A sub-rectangular grass-covered bailey to the west	4, 5
CH8709		Tyrone	Galway	GA103-189----	30410337		539227	717788	Detached seven-bay three-storey over basement country house, built 1779, having three-bay entrance breakfront with distyle Ionic portico to front (south) elevation, and four-bay side elevations. Now roofless and partly ruinous, with moulded limestone cornice	5

Heritage Site ID	Site name	Townland	County	SMR/RMP ID	NIAH ID	RPS ID	ITM_E	ITM_N	Description	Route
CH4724-CH4732, CH4736-CH4739		Earlspark	Galway	GA105-080---- GA105-081---- GA105-082---- GA105-083---- GA105-084---- GA105-086---- GA105-087---- GA105-087001- GA105-205---- GA105-205001- GA105-205002- GA105-208----			563109	714003	Earlspark,a high medieval deerpark, adjoining the southeast shore of Lough Rea. This extensive archaeological landscape, including a two hillforts (GA105-205---- and GA105-086----), two enclosures (GA105-208---- and GA105-087001-), a ringfort (GA105-081----), a field system (GA105-087----), a children's burial ground (GA105-083----), a standing stone (GA105-237----) and a souterrain (GA105-238----)	4

GALWAY TO ATHLONE CYCLEWAY

Option Selection Report

Volume F – Environmental Appendices
Appendix F3 – Landscape and Visual

MGT0525RP0012
Galway to Athlone Cycleway
F01
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REPORT

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to landscape and visual aspects for 4 no. route corridor options for the Galway to Athlone Cycleway Scheme. Although Route Option 2 is still theoretically still part of the assessment, it does not form part of the landscape and visual assessment, due to the monotony of the landscape found alongside the railway line.

This assessment will form part of a Phase 2 – Option Selection Report. See Volume A, Option Selection Report for a description of the project.

1.1 Methodology

The methodology for the landscape and visual option assessment concentrated in particular on the following criteria:

- Landscape Value,
- Landscape Variety,
- Topography,
- Scenic Views and
- Points of Interest.

The assessment entailed both a desk-based study of the proposed route options and various site visits to gather information and data.

1.1.1 Study area

The study area for each of the route options was defined by adding the areas, corridors and lines put forward for public consultation shown in the drawings in Volume D – Stage 2 Route Corridor Options.

Additionally, a one-kilometre offset or buffer zone was added either side of this land area, to take any areas into account that may be visible from the route corridors resulting in different study area corridors for each route options.

While this study area applies to all the aspects explored in the landscape assessment, it particularly applies to the Landscape Value and Variety assessments, where only land falling within the study areas was taken into account.

In terms of points of interest, in addition to those within the study area, significant visitor attractions that links may be created to were also included outside the study areas.

Regarding, topography and significant views, mostly only the views and topography of the study areas are described. However, where interesting topography or views beyond the study area occur these are also included.

1.1.2 Landscape Value

1.1.2.1 Galway County Council Landscape Policy

In the *Landscape and Landscape Character Assessment for County Galway* (LCAG) supporting document to the *Galway County Development Plan 2015 to 2021* landscape values for the whole county have been set out. Very little in-depth detail is offered. For the purpose of this assessment it was considered that a more in-depth study of the landscape value was required.

Due to the very large study area surveying all the area for landscape value was precluded, hence the latest CORINE Land Cover inventory dataset was used to give further detail to the landscape value assessment. While the Corine 2018 dataset has 44 classes of landcover, only 28 different classes occurred within the study area.

These different classes were assessed for their visual landscape value and assigned to low, medium, high and very high landscape value categories as outlined in **Table 1-1**.

Table 1-1 Landscape values assigned to the Corine landcover classifications found in the study area

Very High	High	Medium	Low
Bare Rocks	Inland marshes	Complex Cultivation Patterns	Airports
Broad-leaved forest	Intertidal flats	Coniferous Forestry	Continuous Urban Fabric
Coastal Lagoons	Mixed forest	Discontinuous Urban Fabric	Dump Sites
Salt marshes	Natural Grassland	Green Urban Areas & Golf Courses	Industrial or commercial units
Sea and ocean	Principally Agriculture with Vegetation	Non-irrigated Arable	Mineral Extraction Sites
Water courses	Sparsely Vegetated Areas	Pasture	Road and railway networks
Waterbodies	Transitional woodland-shrub	Peat bogs	Sports Facilities

The landscape value was assigned according to their relative attractiveness, but also rarity. To explain the logic of this approach, illustrative examples of this principle are ‘pasture’ and ‘bare rocks’. The former is the most prevalent landcover in the study area, where the cyclist may be passing field after field of grazing land leading to a sense of monotony. On the other hand, the ‘bare rock’ landscape class is one of the least common and in this case associated with the hill sides and hilltops of the Burren, a unique landscape.

Where these values fall within each route option study area are shown in the drawings in Appendix D5 in Volume D. Additionally, the four landscape value categories as they occur as a percentage of the area for each route option study area outlined in **Table 1-1** above were quantified using GIS software and these percentages have been shown in pie chart form.

1.1.3 Landscape Variety

In the same manner as outline in Section 1.1.2 Landscape Value above, the latest CORINE Land Cover inventory dataset was used to find how much variety of different landscape classifications occurred in each of the different route option study areas.

Additionally, the number of changes between landscape character was noted to assess how many changes along the route there will be in landcover class. This was measured in order to show if the monotony of the most dominant landscape classes such as pasture or peat bog will be broken by other landscape classes. In this case the most probable line for each route option that was available at the time of the analysis being carried out was used, rather than the route option study area. The changes are presented as a number in relation to the landscape classifications occurring in the study area.

1.1.4 Topography & Scenic Views

While the topography of the route is designed to have as few level changes as possible for the comfort of the cyclists, from a landscape perspective changes in levels create interesting landscape features and views not just along the route, but also in the wider landscape. The assessment of the topography, however, mainly relates to views of interesting topographical features, such as hills, ridgelines and valleys that have been recorded during the site visits or will patently be available to the cyclist but could not be recorded due to limitations in site visit time, access issues to private land or lack of clear definition in the exact current route.

This section is mainly descriptive with accompanying photographs where available.

Furthermore, the focal points / views contained in the Landscape and Landscape Character Assessment for County Galway supporting document to the Galway County Development Plan 2015 to 2021 and the Scenic Routes and Scenic Views identified in the Landscape Character Assessment of County Roscommon, part of the Roscommon County Development Plan 2014 – 2020 were taken into consideration.

Additionally, if available, scenic views marked on OSi maps were sought out and included.

Any scenic views found during site visits were recorded, photographed and are presented in Appendix D5 in Volume D.

1.1.5 Points of Interest

Points of Cultural Heritage and recreation for the four route options assessed were identified, recorded and presented along with representative images in the drawings in Appendix D5 in Volume D. This Appendix also contains a series of images for each route option for the four different routes to showcase what each option has to offer to the potential cyclist.

2 EXISTING ENVIRONMENT

Images of some of the key areas of interest described below can be seen in in Appendix D5 in Volume D for each of the four different routes.

2.1.1 Route option 1

The town of Athlone is strategically located at a natural fording point on the River Shannon. From the western bank of the River Shannon at Athlone, Route 1 traverses an area of moderate grazing land of long, coaxial rectangular fields, bounded in the main by hedges and hedge-lined banks and drainage ditches orientated on a general north-east to south-west and north-west to south-east trend.

Moving southward the route crosses Garrynagowna Bog and Carricknaghtan Bog, a flat expanse of generally unenclosed raised bog traversed by a series of twentieth-century rectilinear roads (some grassed over and seldom used) that were likely constructed to facilitate the exploitation of turbary rights. Around Derrynell there are distant views to the Clonmacnoise.

The route travels in a south-southwest direction along an abandoned industrial railway line that crosses the R357 road before crossing the River Suck via a twentieth century Bord na Móna industrial railway bridge into East County Galway just west of Shannonbridge. Bord na Móna began industrial peat milling in the midlands of Ireland in the 1950's. Evidence of industrial peat harvesting, which provided material for power generation, horticulture and domestic fuel, is visible throughout the landscape in the form of narrow-gauge railway lines.

Upon crossing the Suck, the route turns westward, travelling along a towpath on the former Grand Canal. It passes through further areas of industrial peat extraction along the southern portion of the River Suck, where peatland archaeology has been uncovered, towards the southern outskirts of Ballinasloe. This area of peatland is interspersed with areas of moderate grazing land, enclosed into small sub-rectangular and sub-square fields bounded by hedges and bank-lined drains. A similar landscape of small rectangular pasture fields exists to the southwest. Much of the enclosure of this landscape pre-dates the middle of the nineteenth century.

The market town of Ballinasloe is located at a strategic fording point of the River Suck on the historic route between Galway and Dublin. The River Suck is a tributary of the Shannon and has historically defined the boundary between Counties Galway and Roscommon.

Also, within the vicinity of Ballinasloe, is Garbally Demesne located to the southwest of the town.

There are clear views from the Garbally Demesne Country House (now a secondary school) in an easterly direction from the front façade (east elevation), through formally arranged gardens in a clearing in the woodland and what appears to be a ha-ha depicted. A pleasure landscape with parterres and a fishpond are located to the north of the main house. Although some of the demesne features remain, much of the land has reverted by to agriculture and modern buildings associated with the school have been constructed to the south of the country house. Additionally, modern development associated with the expansion of the town of Ballinasloe along the R446 Road has encroached on the demesne landscape to the northeast of the house.

From Ballinasloe the route splits with one heading north and one heading northwest and these converge again at Mountbellew.

Moving in a north-westerly direction, this route skirts the western side of the Bunowen River through areas of good pastureland towards the village of Ahascragh. A six-arch stone bridge built in circa 1780 carries a road over the Ahascragh River to the south of the village.

From Ahascragh the route skirts the Bunowen River, moving in a northerly direction through areas of moderate and unimproved pasture, generally enclosed into rectangular strips bounded by field banks and hedges. Following the river, the route travels along existing paths through forestry plantations near the northern extremity of Clanbrock Demesne to the south of the R358 Road.

The general landscape heading northwards towards the villages of Caltra and Castleblakeney is of moderate pasture interspersed with bogland.

The landscape to the north of Castleblakeney is similar to what preceded along the route to the south, in terms of landcover.

From Ballinasloe the northern route skirts the western side of the River Suck. This area consists of mixed farmland with patches of arable scattered through the pastureland. Fields are slightly larger than in

preceding areas to the south, laid out in a sub-rectangular pattern, bounded by a mixture of hedges, field banks and post-and-wire fences with occasional drystone walls.

The route passes through expanses of open bogland such as Annaghbeg Bog.

The route leaves the bogland and meets an existing track (former industrial railway line) at Knockaunrore. This industrial railway line cuts through the former demesne landscape associated with Daly's Grove, though the remaining demesne buildings are generally screened from view by vegetation and trees that line the trackway. The route follows the alignment of the railway, skirting the eastern and northern edge of further commercial peat extraction sites.

Moving northward the route passes through the commercial peat extraction site at Addergoole North.

The route continues in a north-westerly direction to its convergence with the L3210 Road, where it turns westward along the road. The general landscape is one of small, narrow rectangular fields and areas of open bogland.

Further west there is unimproved bogland, rough grazing and marginal farmland to the south of the River Shiven. The land between the river and the L3210 Road is sparsely populated.

The extensive demesne landscape associated with Mountbellew House, including forests and parklands are located to the south of the village of Mountbellew.

Moving southwest the landscape between Mountbellew and Menlough is one of good quality flat farmland, with fields enclosed in a regular pattern of square and rectangular shapes, bounded by hedges, banks and drystone walls. Southwest of Menlough the land decreases in quality, reverting to bogland and unimproved pasture.

The route travels along existing trackways through Monivea Demesne, with Monivea Castle screened from view by woodland from much of the route. The route follows a maze of trackways and pleasure walks associated with the demesne, passing close to the French Mausoleum. It then travels along the avenue to the village of Monivea, passing Monivea Church of Ireland.

To the west of Monivea the route traverses a flat agricultural landscape of good agricultural land of large square and sub-square fields containing a mixture of pasture and arable.

The route joins the former Tuam to Athenry railway line just north of Bellville Demesne. It follows the railway line southward through a landscape of good agricultural land.

Just north of Athenry the route veers to the east and bypasses eastern Athenry first on the L7126 and then on the edge of pastureland along the Graigabbey River. Near Athenry Castle the route moves south away from the river to run in parallel to the outside of Athenry Town Wall and just north of the R348 before joining route options 3 and 4 in turning north skirting the western parts of Athenry. West of Athenry these routes pass through the lands of the Teagasc Mellows Campus, a mixture of arable and pastoral fields that are predominantly surrounded by traditional stone walls with some hedgerows and treelines subdivided into smaller fields by post and wire fences.

After the Mellows Campus the route travels eastwards through good quality agricultural fields bounded by hedgerows or stone walls, forestry and rural low to medium density residential developments.

North of Oranmore the route passes near Oranmore Firing Range. The landscape here is open grassland bounded by distant tree lines.

Then the route heads south through predominantly good quality agricultural land until Oranmore. From Oranmore the route stays fairly close to the coastal margin to the north of Oranmore Bay before finishing to the east of Ballyloughane Beach.

2.1.2 Route option 3

From Ballinasloe the route corridor takes in a wide area to the south of the Athlone to Galway railway line. Moving west-southwest, it passes through a mixed agricultural landscape.

The Battle of Aughrim Visitor Centre located in the village of Aughrim provides an insight into one of the most important and bloody battles in Irish History.

West of Aughrim the route splits in two with one segment skirting the south of the railway line and the other segment is to the north of the M6 Motorway.

Much of the landscape has a bogland character with extensive coniferous forestry plantations and some areas of pasture. There is also a large quarry at Killagh More immediately northeast of Killagh House. Killagh House is described as 'in ruins' and much of its associated demesne landscape has been planted with trees since the 1990's. To the north are the villages of Kilconnell and Woodlawn.

The two alternative segments merge again just south of Woodlawn. The route corridor encompasses a huge area to the northwest of the village of Newinn and the R348 Road. Between Newinn and the Raford River - with the village of Ballyfa at the south – this "quiet" landscape is one of moderate and poor-quality land, characterised by areas of peat, coniferous plantations and small fields of improved and unimproved pasture.

Moving west, much of the land to the east of the Killimor River consists of unimproved bogland with some improved pasture immediately east of Killimor village.

There is a marked improvement in the quality of the farmland to the west of Killimor and Attymon.

West of the Clonkeen River there is a large area of former industrial peat cutting and coniferous plantations.

Approaching the northeast of Athenry, the quality of the land improves with a regular pattern evident in the field systems, which appear to date to at least the early nineteenth-century.

From Athenry to Galway the route takes a similar path to Routes 1.

2.1.3 Route option 4

Route 4 takes the same alignment as Route 1 southward from Athlone as far as where the route meets the R357 Road just north of the River Suck. From this point the route turns east, crossing the River Shannon into County Offaly at the village of Shannonbridge. From Shannonbridge there is easy access to Clonmacnoise via the R444 Road. At Shannonbridge the route moves southward through the lands associated with the West Offaly Power Station site then crosses the Shannon in a southwest direction via a bridge used by former industrial railway. Here the River Shannon takes on a more of an industrial and riverine communications character.

To the west of the Shannon the route runs along the former Grand Canal south-eastward through an area of industrial peat extraction.

The landscape immediately west is a well enclosed landscape of rectangular and square fields of pasture with some arable apparent to the southwest of Clonfert Crossroads. These fields are in the main bounded by hedges, bank and ditches and post-and-wire fences. At the northern portion of the polygon is Clonfert ecclesiastical site and Clonfert Palace. Moving south from Clonfert Crossroads the landscape of mixed farming includes bogland.

At this point the route follows an existing path along the alignment of the Shannon flood defences as part of the Hymany Way in a general southwest direction as far as the east of Portumna. Here, where river-side vegetation permits there are intermittent views up and down the River Shannon.

The market town of Portumna is located on the northern shores of Lough Derg at a fording point on the River Shannon which acts as a boundary between Counties Galway and Tipperary.

The route moves through the wooded landscape of Portumna Demesne in a westerly direction to the north of Lough Derg. The study area either side of the Killcrow River covers a landscape of mainly marginal bogland with some improved land and few cultural heritage sites.

Approaching and moving west of the village of Woodford the landscape is mixed but dominated by woodland, much of which pre-dates the nineteenth century and bogland to the north of the Woodford River.

Turning northward, the proposed route goes through a landscape of marginal land, much of which has been planted with conifers. To the south of Loughrea the landscape transforms abruptly from marginal land to mixed agriculture in regularly laid out field patterns. Approaching Loughrea, the route runs along the public road on the east and north of the lough, along Barrick Street past St Brendan's Cathedral.

From Loughrea to the M6 Motorway the route is aligned northwest through a mixed agricultural landscape. From the M6 to Athenry the landscape changes slightly, with larger fields - many of which are arable – enclosed by hedges and drystone walls.

From Athenry to Galway, the route is the same as Route 3.

2.1.4 Route option 5

Route 5 takes the same alignment as Route 4 from Athlone southward to Portumna and west through Woodford before diverging at Derrybrien. From Derrybrien this route travels westward through mainly coniferous plantation interspersed by peatland and occasional agricultural lands until approaching Gort. Here the topography is undulating until descending to the flatter areas around Gort. There is a marked improvement in the agricultural capacity of the land to the north of Lough Cutra around Kilbeacanty.

West of Gort the Public Route runs in a westerly direction to the south of Coole Lough (part of Coole Demesne). Coole Park is now home to a nature reserve of approximately 400 hectares of wetland and woodland, operated by the Irish Government. Coole Park Visitor Centre & Gardens are owned and run by the Irish State.

Further west, part of the karst landscape of southwest Galway are included before turning northward towards Kinvarra. Here the route passes through some good examples of the Burren unique landscape of limestone pavement that this part of Ireland is famous for. This is a mixed agricultural landscape of mainly square and rectangular fields bounded by traditional drystone walls and hedges.

Moving north from Kinvarra, the study area covers the landscape between the N67 and the eastern shore of Kinvarra Bay. A heavily enclosed landscape of hedges and drystone walls set out in a general east to west trend extending from the north to south orientated primary lines. The landscape contains quite a lot of woodland, mainly scrub.

Moderate pastureland to the north of Ballinderreen is enclosed in rectilinear shapes in a general northwest to southeast trend. Crossing the Kilcolgan River moving northward, the landscape towards Clarinbridge is similar but somewhat more forested than the area to the south, particularly to the east of the N67 Road and the landscape of Kilcornan Demesne. This scenic village is set close to the mouth of the Clarinbridge River at the northeast end of Dunbulcaun Bay.

The route between the Clarinbridge and Oranmore Rivers covers a huge area either side of the N67 Road. The agricultural character of the land is generally pasture, set out in a ladder-like formation of field systems.

From Oranmore to Galway, the route is the same as Route 3.

3 OPTION SELECTION

3.1 Landscape Value

3.1.1 Landscape Character Assessment for County Galway

The new Draft Galway County Development Plan 2022-2028 (Draft GCPD) is due for publication shortly. As part of this plan a new landscape character assessment was carried out that varies significantly from the landscape character assessment issued with the previous county development plans.

As part of this new landscape character assessment scenic routes designations within Galway have been added for the first time, see **Figure 3-1** and the scenic views, see **Figure 3-2**, have been thoroughly revised.

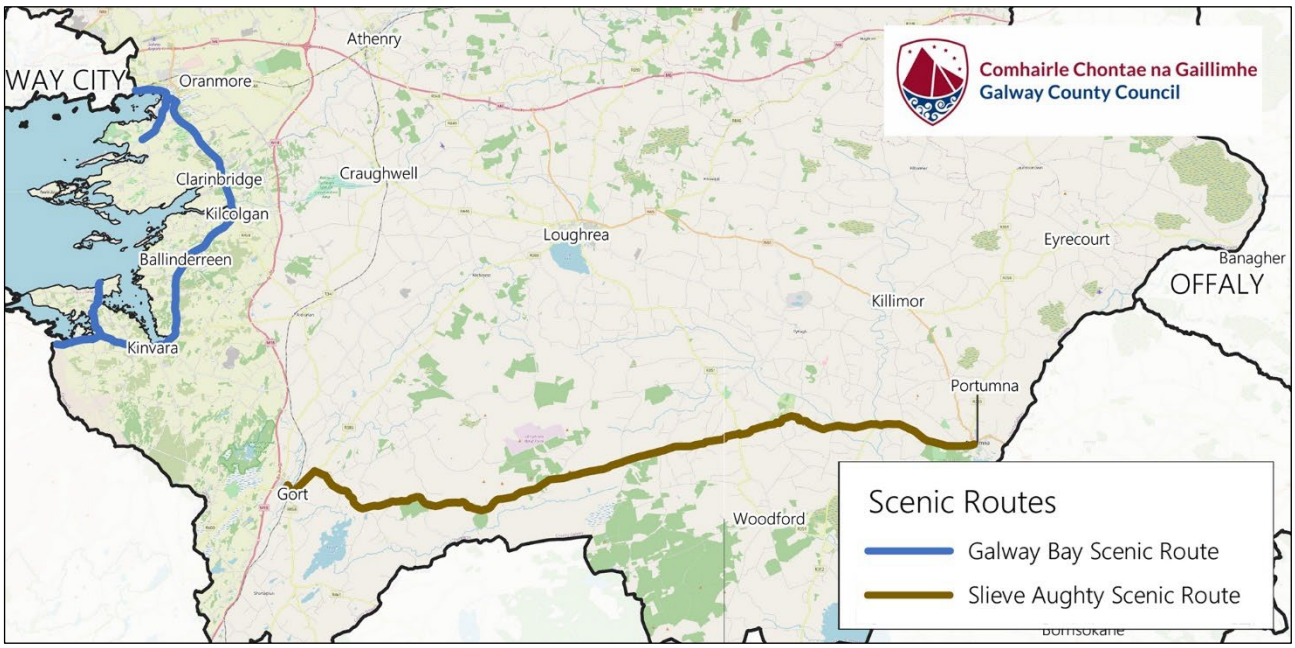

Figure 3-1 Scenic Routes within the wider study area contained in the new Draft GCPD (map extracted from the Landscape Character Assessment)

Figure 3-1 above is an extract from the Scenic routes map contained in the Landscape Character Assessment. It shows that there are two scenic routes within or near the study areas, the Galway Bay scenic Route and the Slieve Aughty Scenic Route.

Description of the Galway Bay Scenic Route is as follows:

> *"The first section of the route follows the Wild Atlantic Way between An Bearna and Inbhear.*
>
> *The route parallels the coast at varying distances with occasional views of the coast across small, scrub-lined fields and between houses. This part of the route is punctuated by a near-continuous conurbation of smaller settlements, many with a denser older cores, some of which are now urbanised – An Bearna and An Spidéal.*
>
> *The second section, is from Oranmore to the outskirts of Kinvarra, this short route passes through a countryside of small fields and scattered housing. Much of the route passes through areas of tall road-side hedges and scrub hazel that confine views. Occasionally elevated portions of roads offer expansive, long-distance views towards the northern Burren as well as Galway Bay.*
>
> *The route is centred on Kinvarra and leads onwards to Ballyvaughan. It also offers opportunities to begin exploration of the most spectacular parts of the northern Burren via lesser used roads.*
>
> *Key Features: Coastal views, Bays, Coastal Villages."*

Description of the Slieve Aughty Scenic Route is as follows:

> *"This route follows the R 352 running from the outskirts of Portumna to the outskirts of Gort. The route passes through extensive areas of commercial forestry and areas of cut-over bog. Parts of the route provide expansive and panoramic views - both north and south. Large arrays of wind turbines are visible along parts of the route.*
>
> *Key Features: Mountains, Forestry, Expansive elevated views."*

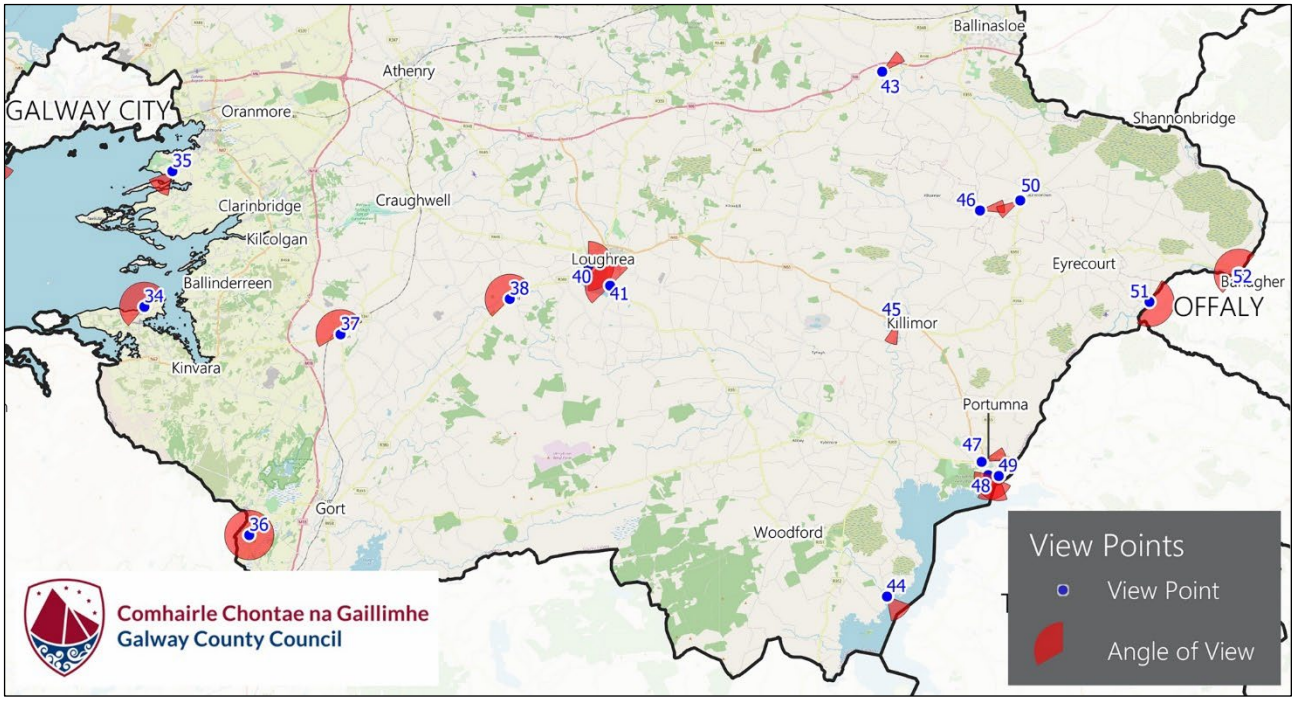

Figure 3-2 Scenic Views within the wider study area contained in the new Draft GCPD (map extracted from the Landscape Character Assessment)

Figure 3-2 above is an extract from the Scenic Views Map contained in the Landscape Character Assessment. It shows that there 16 proposed Scenic Views in the wider study area. However, when looking at the detailed locations of these views only the following views will be along any of Route Options 3, 4 and 5:

Route Option 3

43 Aughrim Church Spire: This view is from the entrance to Aughrim Heritage Park.

Route Option 4

40 Corrys Field walk: This view is from the east end of Corrys Field walk that sticks out into Lough Rea.

41 Loughrea Swimming Area (The Long Point): This view is from the swimming area carpark and shore footpaths.

Route Option 4 & 5

48 Portumna Castle Harbour: This view is from the carpark, marina and picnic area.

49 Lough Derg Water Recreation Park: This view is from the carpark, shore walk and picnic areas.

51 Meelick Quay: This view is from Meelick Quay picnic and parking area.

Route Option 5

35 Rinville: This view is from two points, The Rinville Park parking and picnic area and the marina.

In the *Landscape and Landscape Character Assessment for County Galway* (LCAG) supporting document to the *Galway County Development Plan 2015 to 2021* landscape values for the whole county have been set out, as shown relating to the route options in **Figure 3-3**. As can be seen in **Figure 3-3** very little detail is offered and for the purpose of this assessment a more in-depth study of the landscape value was required.

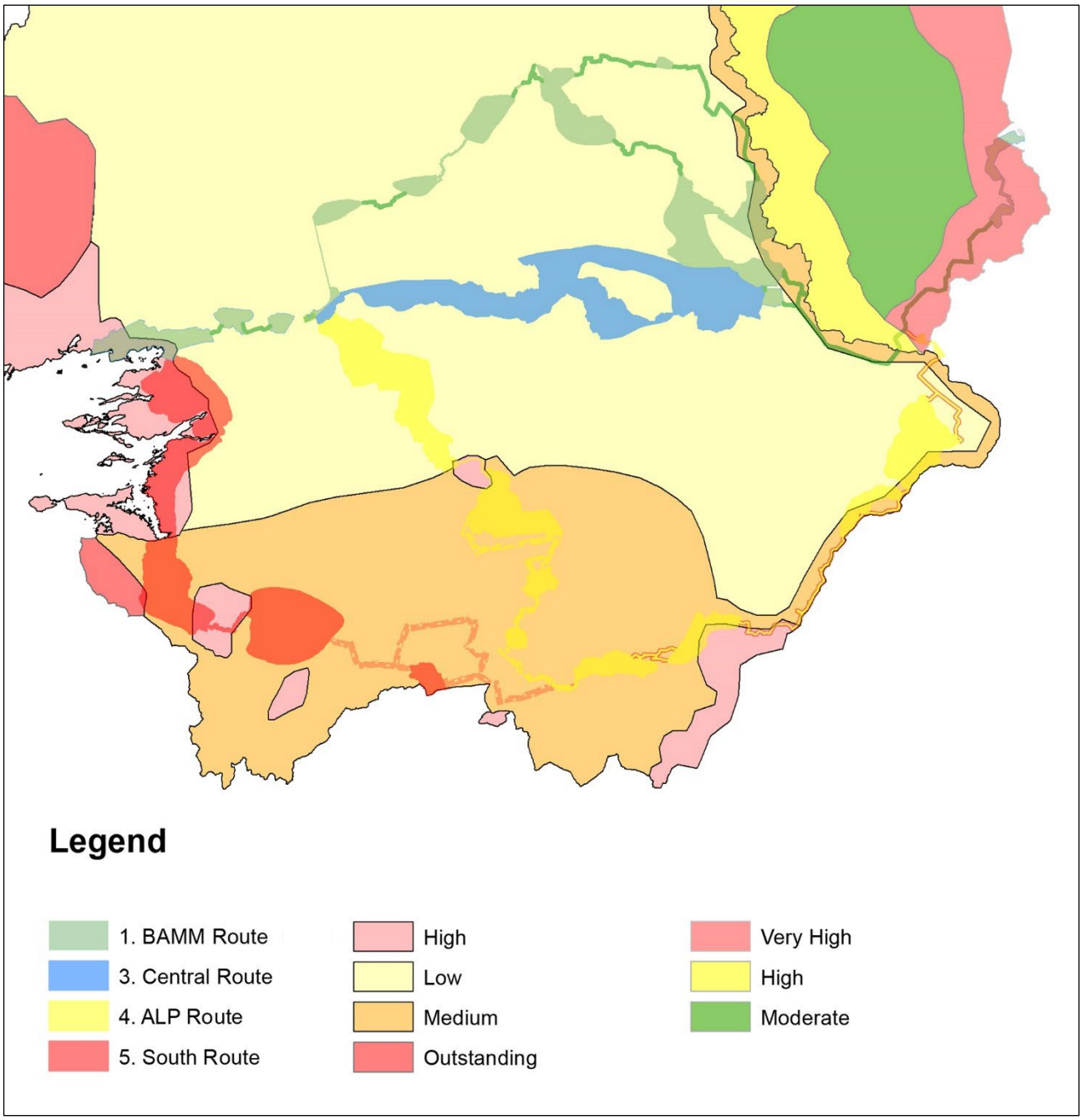

Figure 3-3 Route Options in relation to Co. Galway and Roscommon Landscape Values

The landscape values applied in the LCAG and LCAR will also be discussed. From Galway to Oranmore all routes share one single route that passes through a landscape considered of high value. From the Galway County boundary to the end of the cycleway in Athlone there is a narrow strip of high value and then an area along the River Shannon considered very high value. These two sections shared by all routes will be excluded from the comparisons below.

3.1.1.1 Option 1

The majority of route option 1 between Oranmore to where it merges with the other routes near Shannonbridge passes through landscapes considered of low value by the LCAG. Only the last up to approx. 25 km that is located near the River Shannon passes through an area classified as of moderate landscape value. Once the route enters Co. Roscommon it crosses a narrow stretch of high value landscape before it follows an area of very high landscape value for the last section until it crosses into County Westmeath at the outskirts of Athlone Town.

3.1.1.2 Option 3

Similar to route option 1 this route will mainly be located in landscape of low value until it nears the River Shannon. The section of route within this corridor of moderate value landscape, however, is shorter than for Route Option 1, approx. 10 km. The Co. Roscommon section of this route is the same as for Route Option 1.

3.1.1.3 Option 4

Approximately one quarter of the length of Route Option 4 from Oranmore onwards passes through a low value landscape until it reaches Loughrea Lake. Here Route Option 4 skirts around Loughrea Lake, which is classed as a landscape of high value before continuing southwards in a moderate value landscape for another quarter of its length until Portumna. Lough Derg just to the south of Portumna is also categorised as a high value landscape, which this route will pass close or adjacent to. After the environs of Portumna the route passes adjacent to the River Shannon, a moderate value landscape, except for a short section of low value landscape just to the south of Shannonbridge. The Co. Roscommon section of this route is the same as for Route Option 1 without passing through the short section of high value landscape.

3.1.1.4 Option 5

The wide areas of the option 5 route corridor pass straddle the boundary of high and low landscape areas until Kinvarra, with the majority of this section falling within the high value area. From Kinvarra the landscape the route passes through is mostly considered of moderate value until Cool Park, except where it passes close to the karst landscape of the Burren, which is considered of very high value. Within Coole Park the route passes through a high value landscape before returning to a landscape of moderate value east of Coole Park. The route remains in this landscape of moderate value until it nears Lough Derg. The section from Portumna onwards is described in **Section 3.1.1.3** above. The Co. Roscommon section of this route is the same as for Route Option 1 without passing through the short section of high value landscape.

3.1.2 In Depth Assessment of Landscape Value

3.1.2.1 Introduction

The assessment of more detailed landscape value based on the Corine 2018 data yielded similar results to those found in the landscape value shown in the LCAG. **Figure 3-4** shows the breakdown in percentages for the four different route options in terms of the four landscape values assigned for this more detailed analysis.

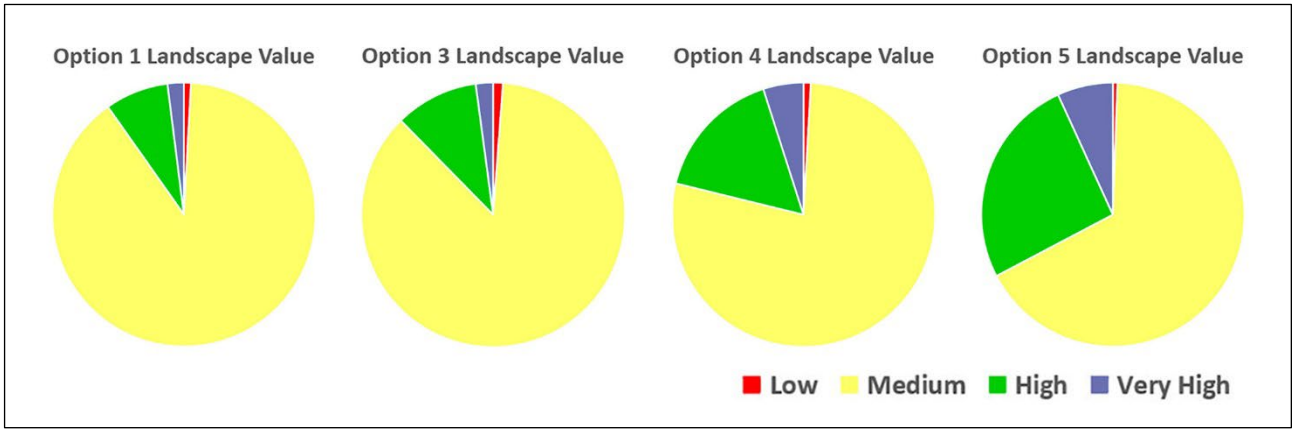

Figure 3-4 Detailed Assessment of landscape value in the respective route option study areas based on Corine 2018 Data

3.1.2.2 Option 1

Landscape Value	Percentage within Route Option Study Area 1
Low	0.9%
Medium	89.3%
High	7.8%
Very High	2.0%

Table 3-1 Landscape values (in %) for Route Option 1 based on detailed evaluation of the route

Figure 3-4 and **Table 3-1** show the percentages of the different landscape values for Route Option 1. Here it was found that 0.9% of the route was of low value and 89.3% of medium value. This medium landscape value is the highest medium landscape value for all the four routes assessed as part of the landscape and visual route option evaluation. Route Option 1 has the lowest proportions of high and very high landscape values of all the four routes.

3.1.2.3 Option 3

Landscape Value	Percentage within Route Option Study Area 3
Low	1.2%
Medium	86.4%
High	10.2%
Very High	2.1%

Table 3-2 Landscape values (in %) for Route Option 3 based on detailed evaluation of the route

Figure 3-4 and **Table 3-2** show the percentages of the different landscape values for Route Option 3. Route Option has the highest percentage of low value landscape at 1.2 %. The vast majority of areas, 86.4%, are considered of medium landscape value. High and very high value landscapes make up only 10.2% and 2.1% of this route option study area, respectively.

3.1.2.4 Option 4

Landscape Value	Percentage within Route Option Study Area 4
Low	0.9%
Medium	77.9%
High	16.2%
Very High	4.9%

Table 3-3 Landscape values (in %) for Route Option 4 based on detailed evaluation of the route

Figure 3-4 and **Table 3-3** show the percentages of the different landscape values for Route Option 4. It shows that medium landscape value is less, at 77.9%, while the high (16.2%) and very high (4.9%) landscape values are greater on this route option relative to Route Options 1 and 3.

3.1.2.5 Option 5

Landscape Value	Percentage within Route Option Study Area 5
Low	0.6%
Medium	66.7%
High	25.6%
Very High	6.8%

Table 3-4 Landscape values (in %) for Route Option 5 based on detailed evaluation of the route

Figure 3-4 and **Table 3-4** show the percentages of the different landscape values for Route Option 4. This route has the least areas with low and medium landscape values of all the routes, 0.6% and 66.7%, respectively. At the same time it has the greatest proportions of areas with high (25.6%) and very high (6.8%) landscape value of all the route options.

3.2 Landscape Variety

3.2.1 Option 1

Route Option 1 passes through 9 different landscape entities. 78% of the route passes through pasture and peat bogs.

Along the entirety of the route option 1 there are 105 changes between landscape classes.

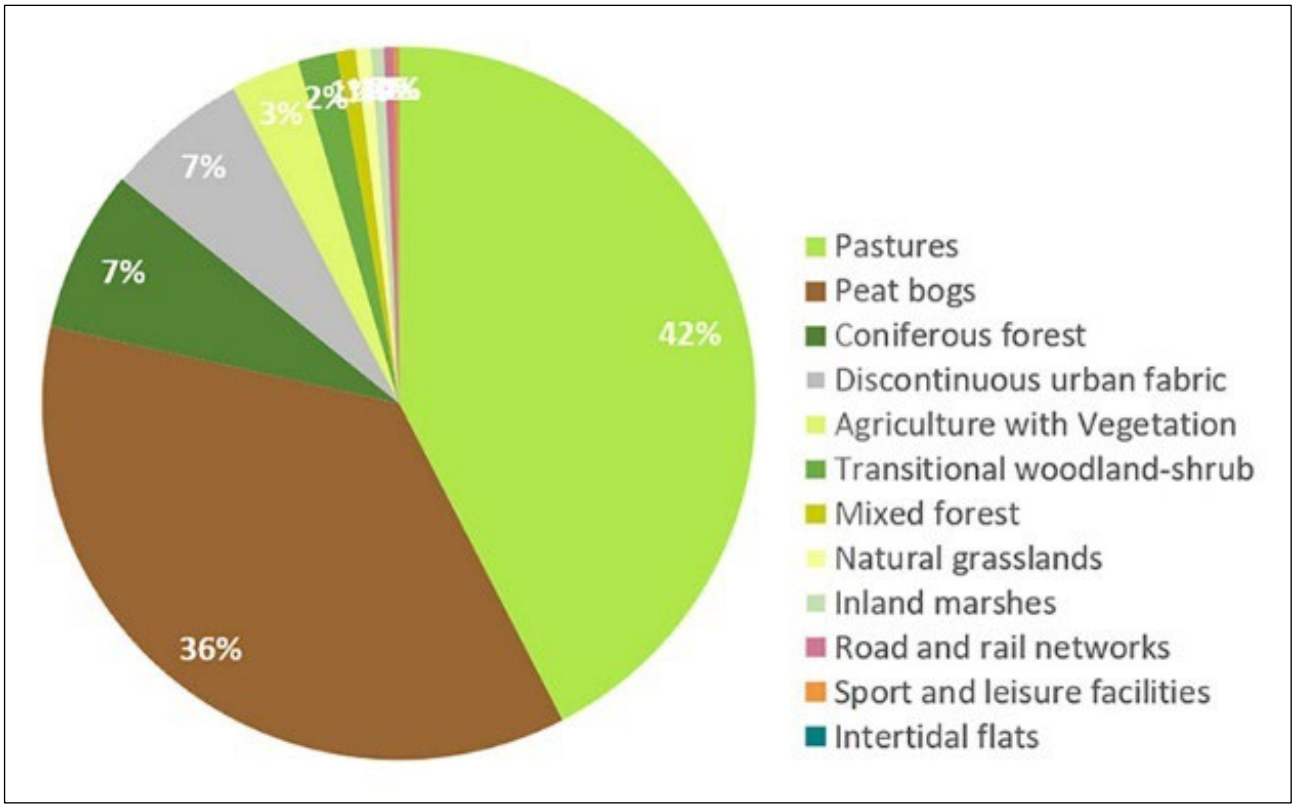

Figure 3-5 Landscape Variety – Route Option 1

3.2.2 Option 3

Route Option 3 passes through 9 different landscape entities. 79% of the route passes through pasture and peat bogs.

In this route option only 90 changes in landscape classes occur, which represents the least changes of all the routes.

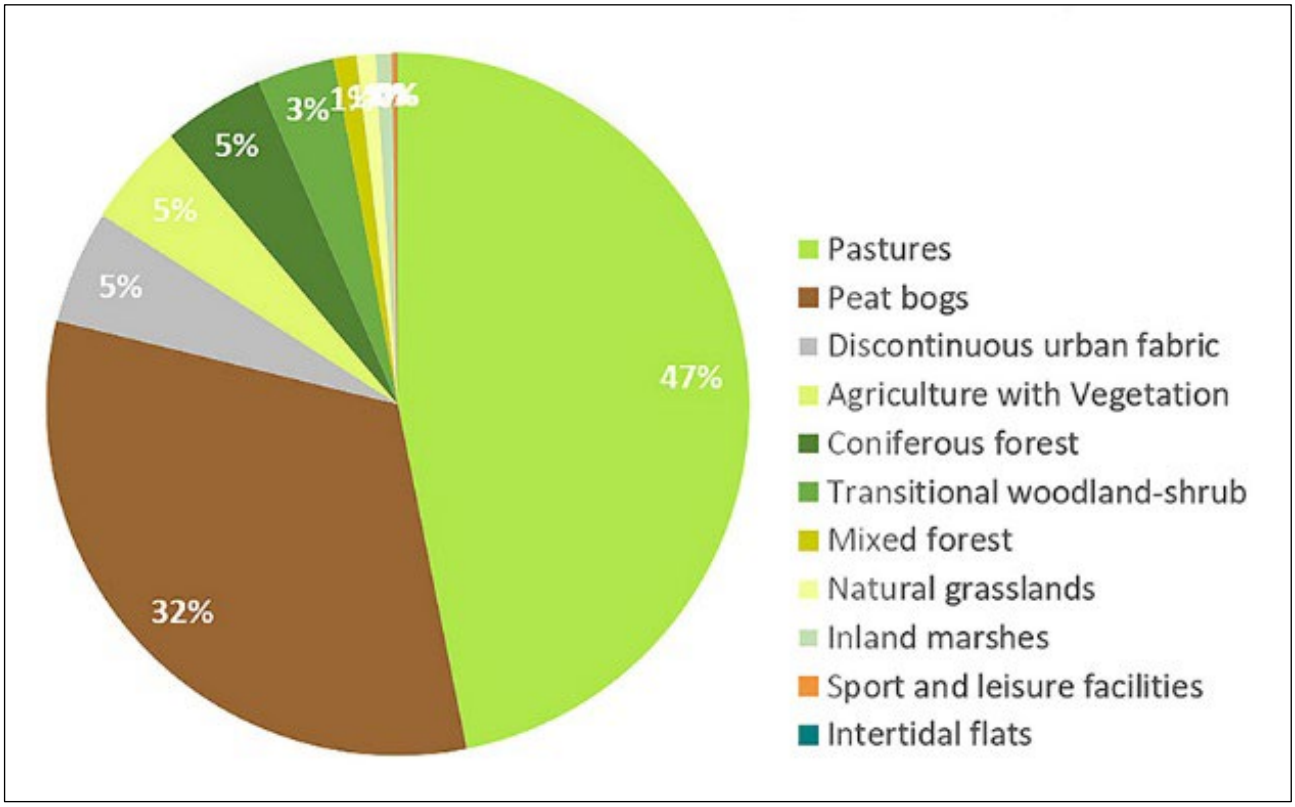

Figure 3-6 Landscape Variety – Route Option 3

3.2.3 Option 4

This route option takes in 12 different landscape entities and the two most common ones, pasture and peat bogs make up 58% of the landscape of the route.

This route option will experience 128 changes in landscape classifications.

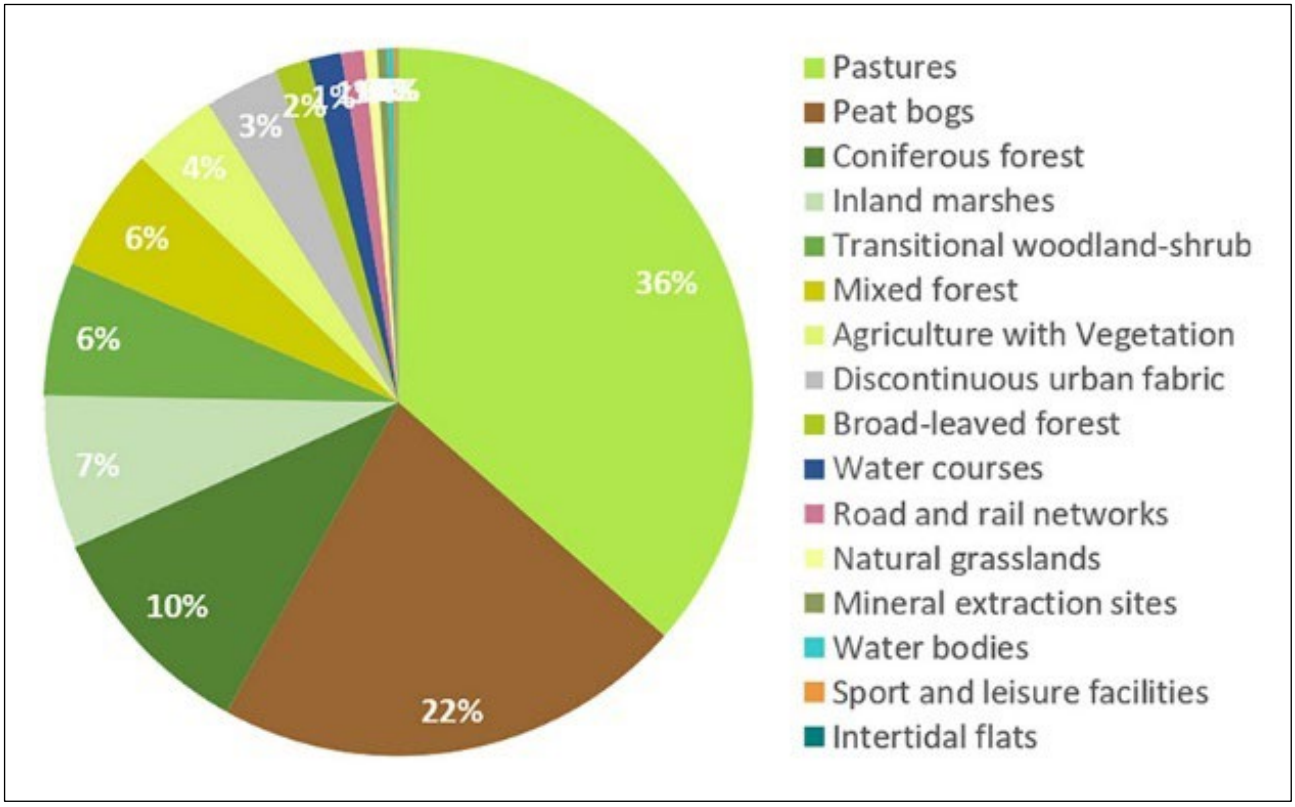

Figure 3-7 Landscape Variety – Route Option 4

3.2.4 Option 5

This route option takes in 12 different landscape entities and the two most common ones, pasture and peat bogs make up 58% of the landscape of the route.

At 285 changes in landscape classifications, route option 5 will have the greatest local variety of all the route options.

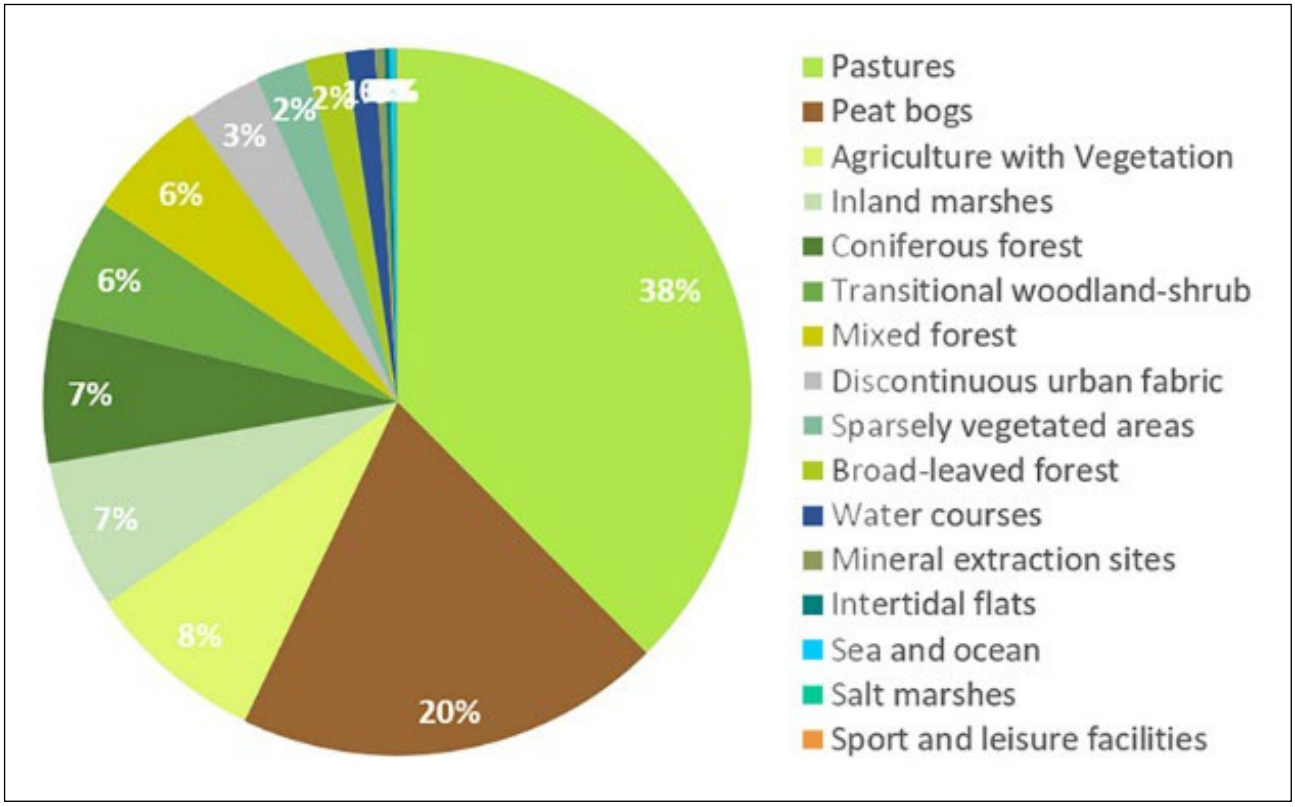

Figure 3-8 Landscape Variety – Route Option 5

3.3 Points of Interest & Cultural Heritage

3.3.1 Option 1

6 No. Amenity and Cultural Heritage Points on and near Route Option 1:

- Oranmore Town and Castle
- Athenry Town
- Monivea Demesne and Village
- Mountbellew Forest Park
- Ballinasloe Town
- Athlone Town and Castle

3.3.2 Option 3

7 No. Amenity and Cultural Heritage Points on and near Route Option 3:

- Oranmore Town and Castle
- Athenry Town
- Woodlawn House and Woods
- Kilconnell Abbey
- Battle of Aughrim Site and Interpretative Centre
- Ballinasloe Town
- Athlone Town and Castle

3.3.3 Option 4

12 No. Amenity and Cultural Heritage Points on and near Route Option 4:

- Oranmore Town and Castle
- Athenry
- Dunsaddle Castle
- Loughrea Town and Lake
- Slieve Aughty Mountains
- Rostura Wood
- Woodford Village
- Portumna Town and Environs
- River Shannon
- Meelick Weir
- Clonfert Cathedral
- Athlone Town and Castle

3.3.4 Option 5

15 No. Amenity and Cultural Heritage Points on and near Route Option 5:

- Oranmore Town and Castle
- Renville Bay and Park
- Clarinbridge and Kilcoran Wood
- Tarrea Pier
- Kinvara Village and Dungaire Castle
- Views of the Burren
- Coole Park
- Gort Town
- Slieve Aughty Mountains
- Rostura Wood
- Woodford Village
- Portumna Town and Environs
- River Shannon
- Meelick Weir
- Clonfert Cathedral
- Athlone Town and Castle

3.4 Topography & Views

Level changes either on the route or seen from a distance greatly improve the landscape experience. Steeper gradients, while making the journey physically more difficult for cyclist, mean that mountain top vistas or views from hill slopes as well as within valleys may be available. The more dramatic these changes, the greater the landscape experience is enhanced.

Significant views either recorded on site or anticipated on sections of the route not accessible at this stage of the project have been listed below. Views can be very localised, depending on relative elevation and local screening. Furthermore, as only public land was accessed as part of this assessment, potential views from private land could not be assessed.

3.4.1 Option 1

Along Route Option 1 level changes are very limited and localised. There are some brief distant views to the Slieve Aughties as well as occasional medium distance views over agricultural land or forestry. However, the generally flat topography coupled with screening by hedgerows and combines to very few views of interest. Along the River Shannon there are some attractive views but riverside vegetation screens much of the river. The main views found along this route are outlined below:

- Oranmore Bay,
- Athenry,

- Medium to long distance views over flat farmland from parts of the disused railway north of Athenry,
- Brief views of Slieve Aughty Mountains west of Monivea,
- Views of River Suck and Ballinasloe Marina,
- Views to Clonmacnoise across River Shannon,
- Views of River Shannon and
- Athlone.

3.4.2 Option 3

Along Route 3 level changes are very limited and localised. There are some brief distant views to the Slieve Aughties as well as occasional medium distance views over agricultural land or forestry. The vista of Woodlawn House seen above a local road is also notable. However, the generally flat topography coupled with screening by hedgerows and combines to very few views of interest. Along the River Shannon there are some attractive views but riverside vegetation screens much of the river. The main views found along this route are outlined below:

- Oranmore Bay,
- Various medium distance view of agricultural land and forestry,
- Woodlawn House,
- Kilconnell Friary,
- Views of River Suck and Ballinasloe Marina,
- Views to Clonmacnoise across River Shannon,
- Views of River Shannon and
- Athlone.

3.4.3 Option 4

This route also has few level changes until it reaches the Sieve Aughties, hence views before this are very limited until Loughrea Lake. Here there is a sequence of fine views across the lake framed by the lower parts of the Slieve Aughties. From the Slieve Aughties in many areas forestry or intervening topography limits the views, however there are various locations with fine views to other higher ground in the Slieve Aughties, along valleys and most notably of Lough Derg and distant hills to the south east of Lough Derg. Moving towards Portumna various more close-up views of Lough Derg can be experienced. Along the River Shannon there are some attractive views but riverside vegetation screens much of the river. The main views found along this route are outlined below:

- Oranmore Bay,
- Athenry,
- Moyode Castle,
- Various views to Loughrea Lake,
- Views from Loughrea from Slieve Aughties,
- Upland Valley views in Slieve Aughties,
- From Slieve Aughties to Lough Derg,
- Views of Lough Derg from Portumna and Environs,
- River Shannon,
- Views to Clonmacnoise across River Shannon and
- Athlone.

3.4.4 Option 5

This route skirts around the western edge of Galway Bay and while the topography here is fairly flat until east of Gort, where there is a break in vegetation cover views of Galway Bay and the Burren are available at various locations along the route. The route also passes close to some smaller bays such as at Renville and west of Clarinbridge. Approaching Kinvarra views of Dungaire Castle and Kinvarra harbour are very attractive. East of Kinvarra there are intermittent views of the Burren uplands. In Coole Park due to the dense woodland views are limited except where the route might pass close to Coole Lough or any of the

other waterbodies. From Coole to Gort and east of Gort until the land rises on the southern slopes of the Slieve Aughties vegetation limits views to short distance views across fields. At the start of the Slieve Aughties there are possible views back to the Burren, however, dense coniferous plantation coupled with topographical undulation mean that medium and long-distance views are mostly screened. All other topography westwards of this is as described for Route Option 4 above. The main views found along this route are outlined below:

- Oranmore Bay,
- Various views of Galway Bay and the Burren,
- Renville,
- Kinvarra and Dungaire Castle,
- Coole Park,
- Views to Slieve Aughites,
- From Slieve Aughties to Burren,
- From Slieve Aughties to Lough Derg,
- Views of Lough Derg from Portumna and Environs,
- River Shannon,
- Views to Clonmacnoise across River Shannon and
- Athlone.

4 CONCLUSION

As part of the route option assessment report Route Options 1, 3, 4 and 5 were assessed for:

- Landscape Value,
- Landscape Variety,
- Topography,
- Scenic Views and
- Points of Interest.

Conclusions for each of these criteria are summarised below.

4.1 Landscape Value

Detailed assessment of the landscape value for each of the route options showed that Route Option 5 has the greatest proportion of very high and high landscape value. Route Option 4 is the second highest in terms of very high and high landscape value. Route options 1 and 3 are quite similar with route option 3 scoring slightly higher in terms of the proportions of high to medium landscape value ratio.

These results were also reflected when the landscape values contained in the Landscape Character Assessment for County Galway along each of the route options were examined.

No designated views and scenic routes contained in the new landscape character assessment to be published as an Appendix with the Galway County Development Plan 2022-2028 could be found along Route Option 1. Route Option 3 had one designed view at Aughrim. Route Option 4 has the most designated views followed closely by Route Option 5. The two scenic routes found in the wider study area are located close to parts of Route Option 5 and a short section of Route Option 4.

4.2 Landscape Variety

Both Route Options 4 and 5 have 16 different landscape classifications within their respective study areas, Route Options 1 and 3 have 12 and 11, respectively.

The greater landscape variety of Route Options 4 and 5 over Route Options 1 and 3 is further shown when you look at how many times the landscape changes. On Route Option 5, 285 changes in landscape classifications occur over the entire length of the currently available most likely route. For Route Options 4, 3 and 1 this number is 128, 90 and 105, respectively.

4.3 Points of Interest & Cultural Heritage

The greatest number of Amenity and Cultural Heritage Points, 15 in total, were found along Route Option 5. Route options 4, 3 and 1 have 12, 7 and 6, respectively.

4.4 Topography & Views

The greatest topographical variation was found along Route Option 4, due to it crossing over the Slieve Aughty mountains. Route Option 5 had the second most topographical variety as it crosses the lower southern slopes of the Slieve Aughties. However, Route 5 also takes in the best views of the ridges and uplands in the Burren.

Route Options 1 and 4 have very minor level changes and thus offer very little in topographical landscape interest.

Equally, views on Route Option 4 and 5 in particular were more frequent and of greater quality than those found on Route Options 1 and 3.

4.5 Overall Conclusions

Route Option 5 has most to offer in terms of landscape value and variety as well as points of interest, topographical interest and scenic views. While Route Option 5 was found to be the forerunner in all categories assessed, Route Option 4 was of the second most interest from a landscape and visual perspective.

Route Options 1 and 3 scored fairly similarly in terms of landscape variety and value, points of interest, topography and views. No clear forerunner could be determined between Route Options 1 and 3 and in all the criteria assessed they fell far behind what will be offered by both Route Options 4 and 5.

GALWAY TO ATHLONE CASTLE NATIONAL CYCLEWAY SCHEME

Option Selection Report

Volume F – Environmental Appendices
Appendix F4 – Soils, Geology and Hydrogeology

MGT0525
Galway to Athlone Castle
National Cycleway Scheme
F01
March 2022

REPORT

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to Soil, Geology and Hydrogeology for 5 no. route corridor options for the Galway to Athlone Cycleway Scheme. This assessment will form part of a Phase 2 – Option Selection Report. See Volume A, Option Selection Report for a full description of the project.

This assessment examines each option in terms of their importance and the possible impacts resulting from the construction of a finally preferred option. The options will be compared, and impacts assessed from a soil, geological and hydrogeological perspective. It should be noted that the optimum option from a soils, geology and hydrogeology perspective may not be the overall optimum option when other environmental, economic, and engineering impacts are considered.

1.1 Methodology

This assessment has been undertaken in accordance with the National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Roads Projects (NRA, 2008) and has regard to the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis Guidelines (2016).

A desktop study was undertaken at constraints stage, (refer to **Volume B - Constraints Report**). The sources of information that were referenced as part of the desk study are summarised below:

- Geological Survey of Ireland (GSI) geology, landslide susceptibility and geological heritage mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- Environmental Protection Agency (EPA), soils, subsoils and extractive industry mapping (https://gis.epa.ie/EPAMaps/);
- GSI Active Quarries List (https://www.gsi.ie/en-ie/publications/Pages/Quarry-Directory.aspx);
- EPA Extractive Industries Register (http://watermaps.wfdireland.ie/ExtractiveFacilities/SearchTheRegister.aspx);
- Geological Survey of Ireland (GSI) aquifer, groundwater vulnerability mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- GSI Karst Features mapping (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- Environmental Protection Agency (EPA) Water Framework Directive (WFD) mapping (http://www.wfdireland.ie/maps.html);
- GSI Water Supply Source Protection Zones (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- EPA Groundwater Bodies Database (https://gis.epa.ie/EPAMaps/);
- Aerial Photography (OSI, Bing);
- Ordnance Survey 1:50,000 Discovery Series; and
- Irish Soil Information System Online Maps (http://gis.teagasc.ie/soils/map.php).

1.2 Study Area and Zone of Influence

This scheme forms part of the Galway to Dublin Cycleway that will be an entirely traffic free route designed exclusively for the use of pedestrians and cyclists. The Galway to Athlone section will commence at Ballyloughane Strand on the east side of Galway City and end at Athlone Castle in County Westmeath.

The geographical Study Area for examination is large enough to include proposed route options for consideration between Galway and Athlone. The area in question is shown in **Volume D.**

The area extends from the west side of Ballyloughane Strand in Galway City along the coastline of Galway Bay to the natural boundary of the River Shannon in Athlone. The most southern extremity extends to Lough

Derg and Coole Park to capture available amenities and recreational facilities offered in Gort and Portumna. The most northern point then extends as far as Tuam for consideration. The Zone of Influence (ZoI) is taken as 1 km either side of the centreline of each route option and public consultation areas.

1.3 Assessment Criteria

The proposed cycleway will generally be approximately 5m wide and follow existing topography quite closely. In the context of Option selection, the influence of the soils and geology can be broken down into technical and environmental aspects, as described below.

Technical

It is technically advantageous to avoid peatlands, which present construction challenges due to the compressible nature of the peat. This is mitigated to a large degree where the cycleway can follow the line of an existing bog road.

Technically, glacial till presents an ideal cycleway foundation.

Overall, it is possible to construct a cycleway on any soil, and the geotechnical challenges are less important than other competing constraints. For example, while it is technical straightforward to construct a cycleway across a pasture underlain by glacial till, it is not beneficial from an agricultural perspective.

Cycleways in boglands, especially those owned by Bord na Mona, and where it is possible to utilise a disused railway; are technically more difficult but present significant advantages in the context of use of public land, and reducing impacts to agriculture.

Environmental

Peatlands are more environmentally sensitive than for example, improved grasslands. However, this sensitivity is greatly reduced when the cycleway can follow existing infrastructure such as disused railways or bog roads.

Where a cycleway is to be built on a peatland, it is proposed that no peat excavation would take place. Rather the cycleway would be 'floated' on the peat, by placing a separation geotextile over the peat surface, and placing the cycleway on this. This results in some settlement of the road, and possibly a somewhat undulating surface but this is considered acceptable for a rural cycleway.

In the context of the Option selection, the additional costs associated with peatland construction are to be accounted for in the cost estimates. Impacts to sensitive habitats are accounted for under Terrestrial ecology. In the context of soils and geology, a slight preference should be given to routes that avoid peatlands.

Construction of a cycleway over karstic areas is considered to be low risk, considering that no significant cuttings are likely, and that it will usually be possible to avoid direct impacts on specific features, such as sinkholes or risings.

Longer routes are likely to require more construction materials, such as crushed rock and concrete.

A cycleway is not considered to be a risk to any geological heritage feature, once it is sensitively designed. There is potential for cycleway routes through interesting geological landscapes, such as peatland or exposed limestone and karst, to significantly enhance the visibility and appreciation of these heritage aspects. For the Galway to Athlone cycleway, the karstic areas in the western side of the area and the peatlands of the midlands have the potential to be part of the story and experience of traversing the route.

However, this is not considered to be a significant differentiator between any of the route corridor options.

The assessment below comprises of a narrative on the soils and geology environment for each route corridor, and highlights any potential significant geological issues, if any.

2 EXISTING ENVIRONMENT

The study area extends from the west side of Ballyloughane Strand in Galway City along the coastline of Galway Bay to the natural boundary of the River Shannon in Athlone. The most southern extremity extends to Lough Derg and Coole Park to capture available amenities and recreational facilities offered in Gort and Portumna. The most northern point then extends as far as Tuam for consideration.

There are 5 routes for consideration, as shown in **Volume D** of the report. The routes to be assessed, a short are listed in the Corridor Assessment Report (MGT0525-RPS-00-XX-RP-Z-Rp0009).

2.1 Soils and Subsoils

The Irish Soil Information System (IFS) developed by Teagasc, Environmental Protection Agency (EPA) Science and Science, Technology and Research & Innovation for the Environment (STRIVE) programme was utilised to identify the soils within the development footprint and environs.

Route maps in relation to soils and subsoils can be found in **Volume D** of the collated report. IFS soil and sub-soil categories relevant to the proposed routes are detailed in **Table 2-1** and **Table 2-2**.

Table 2-1: IFS Soil Categories Associated with Proposed Routes

IFS Soil	IFS Attribute	IFS Code
Deep well drained mineral		1
Derived from mainly acidic parent materials	AminDW	11
Derived from mainly basic parent materials	BminDW	12
Shallow well drained mineral		**2**
Derived from mainly acidic parent materials	AminSW	21
Derived from mainly basic parent materials	BminSW	22
Shallow poorly drained mineral		**3**
Derived from mainly acidic parent materials	AminSP	33
Derived from mainly basic parent materials	Bmin SP	34
Deep poorly drained mineral		**3**
Derived from mainly acidic parent materials	AminPD	31
Derived from mainly basic parent materials	BminPD	32
Poorly drained mineral soils with peaty topsoil		4
Derived from mainly acidic parent materials	AminPDPT	41
Derived from mainly basic parent materials	BminPDPT	42
Shallow, rocky, peaty/non-peaty mineral complexes		**4**
Derived from mainly acidic parent materials	AminSRPT	43
Derived from mainly basic parent materials	BminSRPT	46
Shallow peaty poorly drained mineral		**4**
Derived from mainly basic parent materials	BminSPPT	44
Alluviums		5
Mineral alluvium	AlluvMIN	51
Marl type soils	AlluvMRL	53
Lacustrine–type soils	Lac	56
Peats		**6**
(Raised)		
Raised bog (cutaway)	Cut	62
(Blanket)		
Mountain	BktPt	63
Lowland	BktPt	64
Cutaway	Cut	65
Fen	FenPT	66
Miscellaneous		7
Marine/ Estuarine sediments	MarSed	73
Made	Made	74
Lake	Water	76
Reservoir	Water	76

Table 2-2: IFS Sub-Soil Categories Associated with Proposed Routes

IFS Sub-Soils	IFS Attribute
Tills	
Sandstone till (Devonian)	TDSs
Limestone till (Carboniferous)	TLs
Glaciofluvial Sands and Gravels	
Basic esker sands and gravels	BasEsk
Limestone sands and gravels (Carboniferous)	GLs
Glaciolacustrine deposits	
Lake sediments undifferentiated	L
Alluvium	
Alluvium undifferentiated	A
Marine deposits	
Estuarine sediments (silts/clays)	Mesc
Peats	
Blanket	BktPt
Cutover	Cut
Fen	FenPT
Miscellaneous	
Marine/ Estuarine sediments	Mrl
Made	Made
Lake	Water
Reservoir	Water
Bedrock at surface	Rck
Karstified limestone bedrock at surface	KaRck

2.1.1 Route 1

The main soils along route 1 are fine loamy over limestone bedrock and peat, as outlined in **Table 2-3**. The main sub-soils are peats, with small sections of alluvium and made soils.

Table 2-3: Soil Types within Route Option 1

Soil Type	Soil Description	Drainage	Area within 4m of Route (ha)
Mullabane	Coarse loamy drift with limestones	Well	8.9
Baggotstown	Coarse loamy over calcareous gravels	Well	6.5
Elton	Fine loamy drift with limestones	Moderately	0.8
Faoldroim	Fine loamy drift with limestones	Well	9.5
Clonroche	Fine loamy drift with siliceous stones	Well	1.9
Ballincurra	Fine loamy over limestone bedrock	Well	16.3
Peat	Peat	Poor	59.4
River	River alluvium	Poor	5.4
Tidal Marsh	Tidal marsh	Other	0.4
Urban	Urban	Other	4.6

2.1.2 Route 2

The main soils along route 2 are fine loamy over limestone bedrock and peat, as outlined **Table 2-4**. The main sub-soils are Peats with small sections of glaciofluvial sands and gravels and made soils.

Table 2-4: Soil Types within Route Option 2

Soil Type	Soil Description	Drainage	Area within 4m of Route (ha)
Mullabane	Coarse loamy drift with limestones	Well	17.2
Baggotstown	Coarse loamy over calcareous gravels	Well	1.8
Elton	Fine loamy drift with limestones	Moderately	1.9
Rathowen	Fine loamy drift with limestones	Imperfectly	0.3
Faoldroim	Fine loamy drift with limestones	Well	3.7
Clonroche	Fine loamy drift with siliceous stones	Well	1.8
Ballincurra	Fine loamy over limestone bedrock	Well	12.6
Peat	Peat	Poor	21.5
River	River alluvium	Poor	3.4
Urban	Urban	Other	2.5

2.1.3 Route 3

The main soils along route 3 are fine loamy over limestone bedrock and peat, as outlined in **Table 2-5**. The main sub-soils are peats.

Table 2-5: Soil Types within Route Option 3

Soil Type	Soil Description	Drainage	Area within 4m of Route (ha)
Mullabane	Coarse loamy drift with limestones	Well	14.7
Baggotstown	Coarse loamy over calcareous gravels	Well	4.0
Elton	Fine loamy drift with limestones	Moderately	5.0
Faoldroim	Fine loamy drift with limestones	Well	3.9
Clonroche	Fine loamy drift with siliceous stones	Well	1.9
Ballincurra	Fine loamy over limestone bedrock	Well	12.7
Peat	Peat	Poor	42.8
River	River alluvium	Poor	4.3
Tidal Marsh	Tidal marsh	Other	0.4
Urban	Urban	Other	2.7

2.1.4 Route 4

The main soils along route 4 are peat and fine loamy over limestone bedrock as outlined in **Table 2-6**. The main sub-soils are peats. There is a mixed portion of blanket peats and sandstone tills in the southwestern section of the route.

Table 2-6: Soil Types within Route Option 4

Soil Type	Soil Description	Drainage	Area within 4m of Route (ha)
Mullabane	Coarse loamy drift with limestones	Well	17.2
Puckane	Coarse loamy drift with siliceous stones	Poor	4.7
Clashmore	Coarse loamy drift with siliceous stones	Well	1.7
Baggotstown	Coarse loamy over calcareous gravels	Well	5.8
Elton	Fine loamy drift with limestones	Moderately	0.8
Faoldroim	Fine loamy drift with limestones	Well	7.2
Kilrush	Fine loamy drift with siliceous stones	Poor	1.2
Clonroche	Fine loamy drift with siliceous stones	Well	2.4
Ballincurra	Fine loamy over limestone bedrock	Well	23.7
Peat	Peat	Poor	59.1

River	River alluvium	Poor	13.5
Tidal Marsh	Tidal marsh	Other	0.4
Urban	Urban	Other	3.7
Waterbody	Waterbody	Other	0.5
Lake	Lake	Other	8.1

2.1.5 Route 5

The main soils along route 5 are fine loamy drift with limestone and peat, as outlined in **Table 2-7**. The main sub-soils are fine loamy drift with limestone and peat. There is a mixed portion of blank peat and sandstone tills in the southwestern most section of the route.

Table 2-7: Soil Types within Route Option 5

Soil Type	Soil Description	Drainage	Area within 4m of Route (ha)
Peat	Peat	Poor	53
River	River Alluvium	Poor	15
Lake	Lake Alluvium	Poor	8
Marine	Marine Alluvium	Poor	0.05
Puckane	Coarse loamy drift with siliceous stones	Poor	4
Clashmore	Coarse loamy drift with siliceous stones	Well	7
Clonroche	Fine loamy drift with siliceous	Poor	4
Mullabane	Course loamy drift with limestone	Poor	11
Faoldroim	Fine loamy drift with limestone	Moderate	75
Baggotstown	Course loamy over calcareous gravels	Well	28
Ballincurra	Fine loamy over limestone bedrock	Well	13
Tidal marsh	Tidal marsh	Other	0.5
Urban	Urban	Other	2
Waterbody	Waterbody	Other	0.2

Intersections of the various route options with subsoil types are presented in **Table 2-8**.

Table 2-8: Subsoil Intersections with Proposed Route

Subsoil Type	Route 1	Route 2	Route 3	Route 4	Route 5
Alluvium, undifferentiated (A)	X	X	X	X	X
BasEsk					
Blanket Peat (BkPt)			X	X	X
Cutaway/Cutover Bog (Cut)	X	X	X	X	X
FenPt	X	X	X	X	X
GLs	X	X	X	X	X
Karstified limestone bedrock at surface (KaRck)	X	X	X	X	X
Lake Sediments undifferentiated (L)	X	X	X	X	X
Made Ground (Made)	X	X	X	X	X
Mesc		X	X		
Mrl					
Bedrock (Rck)			X	X	
TDSs			X	X	X
Limestone Till (TLs)			X	X	X
Water	X		X	X	X

2.2 Geology

Route maps in relation to geology can be found in **Volume D** of the collated report.

2.2.1 Route 1

The main geological features along route 1 are lucan formation, visean limestones and burren formation; as outlined in **Table 2-9**. There are portions of massive, unbedded lime-mudstone in the eastern portion of the route. Further points of interest include:

- Geological heritage sites in eastern half of the route.
- 8 mineral locations, predominately in the far western and far eastern portions of the route
- Karsts features in western half of the route.

Table 2-9: Geology Types within Route Option 1

Geology Label	Geology Type	Description	Area within 4 m of Route (ha)
LU	Lucan Formation	Dark limestone & shale (`calp)	71.7
VIS	Visean Limestones (undifferentiated)	Undifferentiated limestone	50.5
BA	Ballysteen Formation	Dark muddy limestone, shale	11.3
WA	Waulsortian Limestones	Massive unbedded lime-mudstone	14.2
NAV	Navan Beds	Dark limestone, mudstone, sandstone	0.9
BU	Burren Formation	Pale grey clean skeletal limestone	42.2

2.2.2 Route 2

The main geological features along route 2 are limestones within the middle section of the route consisting of dark limestone and shale, as outlined in **Table 2-10**. There are portions of massive, unbedded lime-mudstone far western and middle sections of the route. Further points of interest include:

- A small section of geological heritage sites west of the unbedded lime-mudstone
- 5 mineral locations, predominately in the far western portion of the route
- Karsts features interspersed throughout the route.

Table 2-10: Geology Types within Route Option 2

Geology Label	Geology Type	Description	Area within 4 m of Route (ha)
BU	Burren Formation	Pale grey clean skeletal limestone	19.7
LU	Lucan Formation	Dark limestone & shale (`calp)	24.4
VIS	Visean Limestones (undifferentiated)	Undifferentiated limestone	22.7
WA	Waulsortian Limestones	Massive unbedded lime-mudstone	16.3

2.2.3 Route 3

The predominant geological feature along route 3 is dark limestone and shale, as outlined in **Table 2-11**. There are small portions of waulsortian limestones in the far eastern section of the route. Further points of interest include:

- A small section of geological heritage sites in the eastern section of the route.
- 7 mineral locations, throughout the route.
- Karsts features predominately in the far western section of the route.

Table 2-11: Geology Types within Route Option 3

Geology Label	Geology Type	Description	Area within 4 m of Route (ha)
BA	Ballysteen Formation	Dark muddy limestone, shale	13.8
BU	Burren Formation	Pale grey clean skeletal limestone	20.2
LU	Lucan Formation	Dark limestone & shale (`calp)	57.0
NAV	Navan Beds	Dark limestone, mudstone, sandstone	0.9
VIS	Visean Limestones (undifferentiated)	Undifferentiated limestone	23.4
WA	Waulsortian Limestones	Massive unbedded lime-mudstone	14.4

2.2.4 Route 4

The predominant geological feature along route 4 is ballysteen formation (see **Table 2-12**). There are portions of waulsortian limestones within the middle section and far eastern sections of the route. Further points of interest include:

- A small section of geological heritage sites in the eastern section of the route
- 6 mineral locations, throughout the route.
- Karst features predominately in the far western section of the route.

Table 2-12: Geology Types within Route Option 4

Geology Label	Geology Type	Description	Area within 4 m of Route (ha)
AR	Ayle River Formation	Mudstone, siltstone, conglomerate	32.3
BA	Ballysteen Formation	Dark muddy limestone, shale	114.9
BU	Burren Formation	Pale grey clean skeletal limestone	27.0
LLS	Lower Limestone Shale	Sandstone, mudstone & thin limestone	24.3
LU	Lucan Formation	Dark limestone & shale (`calp)	38.1
NAV	Navan Beds	Dark limestone, mudstone, sandstone	0.9
SV	Slevoir Formation	Muddy limestone & calcareous shale	1.8
TS	Terryglass Formation	Muddy limestone & calcareous shale	2.4
VIS	Visean Limestones (undifferentiated)	Undifferentiated limestone	3.6
WA	Waulsortian Limestones	Massive unbedded lime-mudstone	65.8

2.2.5 Route 5

The predominant geological feature along route 5 is Ballysteen formation, as outlined in **Table 2-13**. Further points of interest include:

- Small sections of geological heritage sites throughout the route
- 10 mineral locations, predominantly to the west
- Karsts features predominately in the far western section of the route.

Table 2-13: Geology Types within Route Option 5

Geology Label	Geology Type	Description	Area within 4 m of Route (ha)
BA	Ballysteen Formation	Dark muddy limestone, shale	119.6
LU	Lucan Formation	Dark limestone & shale ('calp)	35.5
WA	Waulsortian Limestone	Massive unbedded lime-mudstone	85.4
LLS	Lower Limestone Shale	Sandstone, mudstone & thin limestone	28.4
TUnt	Newtown Member	Cherty limestone	0.7
TS	Terryglass Formation	Grey calcarenitic & oolitic limestone	2.4
AR	Ayle River Formation	Mudstone, siltstone, conglomerate	61.0
SV	Slevoir Formation	Muddy limestone & calcareous shale	1.8
TU	Tubber Formation	Crinoidal & cherty limestone & dolomite	2.5
VIS	Visean Limestones (undifferentiated)	Undifferentiated limestone	0.9
TUcq	Castlequarter Member	Monotonous limestone and dolomite	11.8
BUhh	Hawkhill Member	Peloidal limestone with chert	12.4
NAV	Navan Beds	Dark limestone, mudstone, sandstone	0.9
BU	Burren Formation	Pale grey clean skeletal limestone	19.8

2.3 Hydrogeology

Route maps in relation to hydrogeology and groundwater vulnerability can be found in **Volume D** of the collated report. The study area is underlain by the Clarinbridge Groundwater Body (GWB). The groundwater quality of the water body is currently at 'Good' status for the 2010-2015 Water Framework Directive (WFD) reporting period.

The area contains a regionally important aquifer - Karstified (conduit) (Rkc).

The GSI groundwater vulnerability mapping shows the locations of the proposed route options against their associated groundwater vulnerability ranking. Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities.

2.3.1 Route 1

There are two aquifer types along within route 1: "Regionally Important Aquifer – Karstified (conduit)" and "Locally Important Aquifer – Bedrock", which is moderately productive only in local zones.

2.3.2 Route 2

The main aquifer type within route is “Locally Important Aquifer – Bedrock”, which is moderately productive only in local zones. There are small portions of “Regionally Important Aquifer – Karstified (conduit)” within the route.

2.3.3 Route 3

The main aquifer type within route is “Locally Important Aquifer – Bedrock”, which is moderately productive only in local zones. There are two small sections of “Regionally Important Aquifer – Karstified (conduit)” within the route.

2.3.4 Route 4

There are two aquifer types along within route: “Regionally Important Aquifer – Karstified (conduit)” and “Locally Important Aquifer – Bedrock”, which is moderately productive only in local zones and “Poor Aquifer – Bedrock”, which is Generally Unproductive except for Local Zones.

2.3.5 Route 5

There are two aquifer types along within route: “Regionally Important Aquifer – Karstified (conduit)” and “Locally Important Aquifer – Bedrock”, which is moderately productive only in local zones and “Poor Aquifer – Bedrock”, which is Generally Unproductive except for Local Zones. There is a small section of “Locally Important Aquifer – Karstified” and a Lake in the south-eastern portion of the route.

3 OPTION SELECTION AND CONCULSION

The proposed cycleway will generally be approximately 8m wide and follow existing topography quite closely. In the context of Option selection, the influence of the soils and geology can be broken down into technical and environmental aspects, as described below.

Technical

It is technically advantageous to avoid peatlands, which present construction challenges due to the compressible nature of the peat. This is mitigated to a large degree where the cycleway can follow the line of an existing bog road or railway tracks.

Technically, glacial till presents an ideal cycleway foundation.

Overall, it is possible to construct a cycleway on any soil, and the geotechnical challenges are less important than other competing constraints. For example, while it is technically straightforward to construct a cycleway across a pasture underlain by glacial till, it is not beneficial from an agricultural perspective.

Cycleways in boglands, especially those owned by Bord na Mona, and where it is possible to utilise a disused railway; are technically more difficult but present significant advantages in the context of using public land and reducing impacts to agriculture.

Environmental

Peatlands are more environmentally sensitive than for example, improved grasslands. However, this sensitivity is greatly reduced when the cycleway can follow existing infrastructure such as disused railways or bog roads.

Where a cycleway is to be built on a peatland, it is proposed that no peat excavation would take place. Rather the cycleway would be ‘floated’ on the peat, by placing a separation geotextile over the peat surface, and placing the cycleway on this. This results in some settlement of the cycleway, and possibly a somewhat undulating surface but this is considered acceptable for a rural cycleway.

In the context of the Option selection, the additional costs associated with peatland construction are to be accounted for in the cost estimates. Impacts to sensitive habitats are accounted for under Terrestrial ecology. In the context of soils and geology, a slight preference should be given to routes that avoid peatlands.

Construction of a cycleway over karstic areas is considered to be low risk, considering that no significant cuttings are likely, and that it will usually be possible to avoid direct impacts on specific features, such as sinkholes or risings.

Longer routes are likely to require more construction materials, such as crushed rock, bituminous materials and concrete.

A cycleway is not considered to be a risk to any geological heritage feature, once it is sensitively designed. There is potential for cycleway routes through interesting geological landscapes, such as peatland or exposed limestone and karst, to significantly enhance the visibility and appreciation of these heritage aspects. For the Galway to Athlone cycleway, the karstic areas in the western side of the scheme area and the peatlands of the midlands have the potential to be part of the story and experience of traversing the route.

Overall, geology is not considered to be a significant differentiator between any of the route corridor options.

GALWAY TO ATHLONE CYCLEWAY

Option Selection Report

Volume F – Environmental Appendices
Appendix F5 – Hydrology

MGT0525RP0012
Galway to Athlone Cycleway
F01
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REPORT

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to Hydrology for 5 no. route corridor options for the Galway to Athlone Cycleway Scheme. This assessment will form part of a Phase 2 – Option Selection Report. See Volume A, Option Selection Report for a description of the project.

The principal objectives of this report are to:

- Complete a desk study and to obtain relevant hydrological data for each option,
- Identify and describe sites of known or potential hydrological interest,
- Assess the significance of the likely impacts of the proposed cycleway scheme on the existing hydrological environment along each option.

In fulfilling these objectives, a full consideration of the likely hydrological environmental effects of possible options was carried out. An informed choice was therefore made with the knowledge of hydrological consequences. This enabled the importance of the proposed effects and the scope for mitigating these to be appropriately evaluated. This report shall be read in conjunction with the other technical appendices to the Option Selection Report.

1.1 Methodology

This report is prepared having regard to the *TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*[1] as recommended by the TII *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis*[2].

A comparative evaluation of the options is undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option(s). The data required to inform the hydrological section of the Option Selection Report is obtained by:

- Undertaking a desk study to identify and retrieve relevant published information on the hydrology of the defined study area. Sources of information consulted are identified in **Table 1.1**.
- Consulting with statutory consultees and relevant Government agencies, local authorities, and non-governmental organisations in order to confirm official designations and legislative requirements in respect of protected sites, surface waters and aquifers.
- Supplementing the above desk study information with any further readily retrievable data specifically relating to the options, including the examination of any locally relevant information or data.
- Use of stereoscopic aerial photographs to identify previously unmapped soft or disturbed ground, potential geohazards or hydrogeological features in the vicinity of the options.

Table 1.1 Sources of Hydrological Information

Hydrological Attribute	Sources
Surface Water Features	• 1:50,000 Discovery Series Maps (Ordnance Survey Ireland) • 1:10,560 Maps (Ordnance Survey Ireland) • EPA
Catchments	• Rivers and their Catchment Basins, Map by Ordnance Survey (1958) • River Basin Management Projects (http://www.wfdireland.ie/) • Local Authorities (Environment Section) • EPA • OPW Flood Studies Update Web Portal
River Flows	• Hydrometric Section, Office of Public Works (www.opw.ie)

[1] TII http://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf
[2] TII PE-PAG-02031, (October 2016)

	• HydroNet site, EPA • OPW Flood Studies Update Web Portal • OPW Flood Hazard & Flood Risk Information (FloodInfo.ie)
Flooding	• Engineering Services Section, Office of Public Works • Flooding Records at National Flood Hazard Website http://www.floodmaps.ie/ • OPW Flood Hazard & Flood Risk Information (FloodInfo.ie) • OPW Preliminary Flood Risk Assessment Mapping
Water Quality	• EPA
Public Water Supply	• Irish Water • Local Authorities • Group Water Schemes

1.2 Study Area and Zone of Influence

This scheme forms part of the Galway to Dublin Cycleway that will be an entirely traffic free route designed exclusively for the use of pedestrians and cyclists. The Galway to Athlone section will commence at Ballyloughane Strand on the east side of Galway City and end at Athlone Castle in County Westmeath.

The geographical Study Area for examination is large enough to include proposed route options for consideration between Galway and Athlone. This is based on the maximum desired scale of the Cycleway, identified through international market research, and the desire to connect to larger towns at reasonable intervals.

The area extends from the west side of Ballyloughane Strand in Galway City along the coastline of Galway Bay to the natural boundary of the River Shannon in Athlone. The most southern extremity extends to Lough Derg and Coole Park to capture available amenities and recreational facilities offered in Gort and Portumna. The most northern point then extends as far as Tuam for consideration.

The Zone of Influence (ZoI) for this assessment considered the potential effects, that may arise during the construction and operation phases of a road project of this size. The ZoI, therefore, extended outside the route option footprints to include upstream and downstream reaches of watercourse crossing points, plus nearby waterbodies that have a hydrological connection to the project.

Given the karst nature of some of the local geology, potential connectivity to surface waters via groundwater and underground drainage features were also taken into consideration

2 EXISTING ENVIRONMENT

2.1 Desk Study

2.1.1 Overview

The study area lies within the WFD catchments of Upper and Lower Shannon, Galway Bay South East (29) and Corrib (30). The study are forms part of the National Hydrometric Areas Lower Shannon 25, Upper Shannon 26, Galway Bay South East 29, and Corrib 30. The main surface water features potentially impacted by the five option extents include Lough Rea, Lough Derg, and the Rivers, Clare, Dunkellin, Shannon and Suck, along with a number of other tributaries and rivers that mainly discharge to the marine environment at Oranmore and Clarinbridge.

Ireland's longest river the River Shannon forms the border between Galway/Roscommon and Offaly from Athlone to Portumna, before it enters into Lough Derg. The River Suck along the Galway Roscommon border is the Shannon's main tributary. The Dunkellin River rises in the area around Loughrea and flows west before entering the Atlantic Ocean into Galway Bay near Kilcolgan.

Lough Rea (IE_WE_29_194) is approx. 3.01 km^2 and is fed by the Kilcolgan_010 Stream (IE_WE_29K010100).

The northern edge of Lough Derg (IE_SH_25_191a) is crossed by the study area. Lough Derg is approx. 116.5 km^2. It is fed by Bow_010 (IE_SH_25B100200), Newtown_010 (IE_SH_25N030200) and Shannon (Lower)_030 (IE_SH_25S012350) Streams.

2.1.2 Watercourse and their Catchments & Sub-Catchments

An overview of each watercourse and their respective catchments and sub-catchments potentially impacted by the proposed overall option extents are presented in **Table 2.1**. The impacts of each of these instances will be assessed individually in **Section 3.1**. The waterbodies within the study area are provided in **Volume D** of the report.

Table 2.1 Potentially Impacted Watercourses and Their Catchments

EPA Name	EU River Waterbody Code	WFD Catchment	WFD Sub-Catchment	WFD River Sub-Basin	Options
Carrowmoneash (Oranmore)_010	IE_WE_29C050400	Galway Bay South East (29)	Carrowmoneash [Oranmore]_SC_010	Carrowmoneash (Oranmore)_010	All Options
Rockhill (Galway)_010	IE_WE_29R090950	Galway Bay South East (29)	Carrowmoneash [Oranmore]_SC_010	Rockhill (Galway)_010	5
Clarinbridge_050	IE_WE_29C020500	Galway Bay South East (29)	Clarinbridge_SC_010	Clarinbridge_050	5
Kilcolgan_050	IE_WE_29K010700	Galway Bay South East (29)	Kilcogan_SC_020	Kilcolgan_050	5
Kilchreest_010	IE_WE_29K022100	Galway Bay South East (29)	Kilchreest_SC_010	Kilchreest_010	4,5
Boleyneendorrish_030	IE_WE_29B040800	Galway Bay South East (29)	Boleyneendorrish_SC_010	Boleyneendorrish_030	5
Cannahowna_010	IE_WE_29C010200	Galway Bay South East (29)	Cannahowna_SC_010	Cannahowna_010	5
Beagh_010	IE_WE_29B020100	Galway Bay South East (29)	Cannahowna_SC_010	Beagh_010	5
Boleyneendorrish_020	IE_WE_29B040300	Galway Bay South East (29)	Boleyneendorrish_SC_010	Boleyneendorrish_030	5
Owendalulleegh_040	IE_WE_29O010900	Galway Bay South East (29)	Cannahowna_SC_010	Owendalulleegh_050	5
Owendalulleegh_030	IE_WE_29O010800	Galway Bay South East (29)	Cannahowna_SC_010	Owendalulleegh_030	5
Owendalulleegh_020	IE_WE_29O010700	Galway Bay South East (29)	Cannahowna_SC_010	Owendalulleegh_020	5
Owendalulleegh_010	IE_WE_29O010500	Galway Bay South East (29)	Cannahowna_SC_010	Owendalulleegh_010	4,5

Ballinlough Stream_010	IE_SH_25B150300	Lower Shannon (25C)	Cappagh[Galway]_SC_010	Ballinlough Stream_010	4
Woodford (Galway)_010	IE_SH_25W010040	Lower Shannon (25C)	Bow_SC_010	Woodford (Galway)_010	4,5
Woodford (Galway)_030	IE_SH_25W010300	Lower Shannon (25C)	Bow_SC_010	Woodford (Galway)_030	4,5
Moannakeeba_East_010	IE_SH_25M290660	Lower Shannon (25C)	Bow_SC_010	Moannakeeba_East_010	4,5
Kilcrow_070	IE_SH_25K010700	Lower Shannon (25C)	Kilcrow_SC_010	Shannon (Lower)_040	4,5
Shannon (Lower)_040	IE_SH_25A050100	Lower Shannon (25C)	Shannon [Lower]_SC_070	Shannon (Lower)_040	4,5
Shannon (Lower)_030	IE_SH_25S012350	Lower Shannon (25B)	Shannon [Lower]_SC_050	Shannon (Lower)_030	4,5
Gortaha_010	IE_SH_25G560730	Lower Shannon (25B)	Shannon [Lower]_SC_050	Gortaha_010	4,5
Carrownafinnoge_010	IE_SH_25C180820	Lower Shannon (25B)	Shannon [Lower]_SC_050	Carrownafinnoge_010	4,5
Incherky_010	IE_SH_25I020930	Lower Shannon (25B)	Shannon [Lower]_SC_030	Incherky_010	4,5
Eyrecourt Stream_010	IE_SH_25E010200	Lower Shannon (25B)	Shannon [Lower]_SC_050	Eyrecourt Stream_010	4,5
Shannon (Lower)_020	IE_SH_25S012060	Lower Shannon (25B)	Shannon [Lower]_SC_040	Shannon (Lower)_020	4,5
Derryholmes_010	IE_SH_25Y150770	Lower Shannon (25B)	Shannon [Lower]_SC_050	Derryholmes_010	4,5
Shannon (Lower)_010	IE_SH_25S012000	Lower Shannon (25B)	Shannon [Lower]_SC_050	Shannon (Lower)_010	4,5
Suck_160	IE_SH_26S071550	Lower Shannon (26D)	Suck_SC_100	Suck_160	1,3,4,5
Shannon (Upper)_130	IE_SH_26S021920	Upper Shannon (26G)	Shannon [Lower]_SC_020	Shannon (Upper)_130	1,4,5
Ballydangan_020	IE_SH_26B140200	Upper Shannon (26G)	Shannon [Lower]_SC_020	Ballydangan_020	1,4,5
Shannon (Upper)_120	IE_SH_26S021800	Upper Shannon (26G)	Shannon [Upper]_SC_100	Shannon (Upper)_120	All Options
Cross (Roscommon)_040	IE_SH_26C100400	Upper Shannon (26G)	Shannon [Upper]_SC_100	Cross (Roscommon)_040	All Options
Drumkeary Stream_010	IE_SH_25D110300	Lower Shannon (25C)	Cappagh [Galway]_SC_010	Drumkeary Stream_010	4
Duniry_020	IE_SH_25D070400	Lower Shannon (25C)	Cappagh [Galway]_SC_010	Duniry_020	4
Cappagh (Galway)_010	IE_SH_25C030100	Lower Shannon (25C)	Cappagh [Galway]_SC_010	Cappagh (Galway)_020	4
Cappagh (Galway)_020	IE_SH_25C030500	Lower Shannon (25C)	Cappagh [Galway]_SC_010	Cappagh (Galway)_020	4
Kilcolgan_010	IE_WE_29K010100	Galway Bay South East (29)	Kilcogan_SC_010	Kilcolgan_010	4
Kilcolgan_030	IE_WE_29K010400	Galway Bay South East (29)	Kilcogan_SC_010	Kilcolgan_030	4
Carra Stream_020	IE_WE_29C032000	Galway Bay South East (29)	Kilcogan_SC_010	Carra Stream_020	4
Toberdoney_020	IE_WE_29T010700	Galway Bay South East (29)	Kilcogan_SC_010	Toberdoney_020	4
Raford_030	IE_WE_29R010500	Galway Bay South East (29)	Raford_SC_010	Raford_030	2,3,4
Clarinbridge_040	IE_WE_29C020400	Galway Bay South East (29)	Clarinbridge_SC_010	Clarinbridge_040	1,2,3,4
Clarinbridge_030	IE_WE_29C020300	Galway Bay South East (29)	Clarinbridge_SC_010	Clarinbridge_030	1,2,3,4
Clarinbridge_020	IE_WE_29C020200	Galway Bay South East (29)	Clarinbridge_SC_010	Clarinbridge_020	1,2,3,4
Clarinbridge_010	IE_WE_29C020040	Galway Bay South East (29)	Clarinbridge_SC_010	Clarinbridge_010	2,3

Raford_020	IE_WE_29R010200	Galway Bay South East (29)	Raford_SC_010	Raford_020	3
Raford_010	IE_WE_29R010100	Galway Bay South East (29)	Raford_SC_010	Raford_010	3
Ballymabilla_010	IE_WE_29B030300	Galway Bay South East (29)	Raford_SC_010	Ballymabilla_010	3
Derrymullan Stream_010	IE_SH_26D070400	Upper Shannon (26D)	Suck_SC_080	Derrymullan Stream_010	3
Ballinure_010	IE_SH_26B010300	Upper Shannon (26D)	Suck_SC_100	Ballinure_010	3
Suck_150	IE_SH_26S071500	Upper Shannon (26D)	Suck_SC_100	Suck_150	1,3
Suck_140	IE_SH_26S071400	Upper Shannon (26D)	Suck_SC_090	SUCK_140	1,2,3
Laurencetown Stream_020	IE_SH_26L070500	Upper Shannon (26D)	Suck_SC_100	Laurencetown Stream_020	1
Ahascragh_010	IE_SH_26A010050	Upper Shannon (26D)	Suck_SC_080	Ahascragh_010	2,3
Derrymullan Stream_010	IE_SH_26D070400	Upper Shannon (26D)	Suck_SC_080	Derrymullan Stream_010	2,3
Derrymullan Stream_020	IE_SH_26D070700	Upper Shannon (26D)	Suck_SC_080	Derrymullan Stream_020	1,2,3
Cuilleen Stream_010	IE_SH_26C170400	Upper Shannon (26D)	Suck_SC_090	Cuilleen Stream_010	2
Suck_130	IE_SH_26S071200	Upper Shannon (26D)	Suck_SC_090	Suck_130	1,2
Killeglan_010	IE_SH_26K040200	Upper Shannon (26D)	Suck_SC_090	Killeglan_010	2
Mihanboy_010	IE_SH_26M040200	Upper Shannon (26G)	Suck_SC_100	Mihanboy_010	2
Ahascragh_040	IE_SH_26A010500	Upper Shannon (26D)	Suck_SC_080	Ahascragh_040	1
Lughanagh_010	IE_SH_26L530780	Upper Shannon (26D)	Suck_SC_070	Lughanagh_010	1
Killaderry Stream_010	IE_SH_26K050940	Upper Shannon (26D)	Suck_SC_070	Killaderry Stream_010	1
Ahascragh_020	IE_SH_26A010200	Upper Shannon (26D)	Suck_SC_080	Ahascragh_020	1
Shiven (South)_030	IE_SH_26S030200	Upper Shannon (26D)	Castlegar_SC_010	Shiven (South)_030	1
Castlegar_010	IE_SH_26C030100	Upper Shannon (26D)	Suck_SC_010	Castlegar_010	1
Castlegar_020	IE_SH_26C030200	Upper Shannon (26D)	Suck_SC_010	Castlegar_020	1
Abbert_020	IE_WE_30A010100	Corrib (30)	Clare[Galway]_SC_050	Abbert_020	1
Abbert_030	IE_WE_30A010300	Corrib (30)	Clare[Galway]_SC_050	Abbert_030	1

Drainage Issues

Historical 6-inch mapping has revealed very little change in drainage regimes in the study area.[3]

Figure 2-1 identifies Oranmore Bay, as well as Clarinbridge and Dunkellin Rivers.

Figure 2-2 identifies the River Suck, north of Balinasloe and the Upper Shannon River flowing south from Athenry towards Eyrecourt.

Figure 2-3 identifies the point where River Suck joins the Shannon flowing southeast of Eyrecourt.

Figure 2-4 identifies the area between Lough Rea and Lough Derg, where the Cappagh River and Lower Shannon discharge to Lough Derg.

[3] Historical 6inch Mapping, (geohive.maps.arcgis.com), accessed October 2021.

Figure 2-1: Location of Historical Water Features Galway to Athenry[4]

Figure 2-2: Location of Historical Water Features Ballinasloe to Athlone

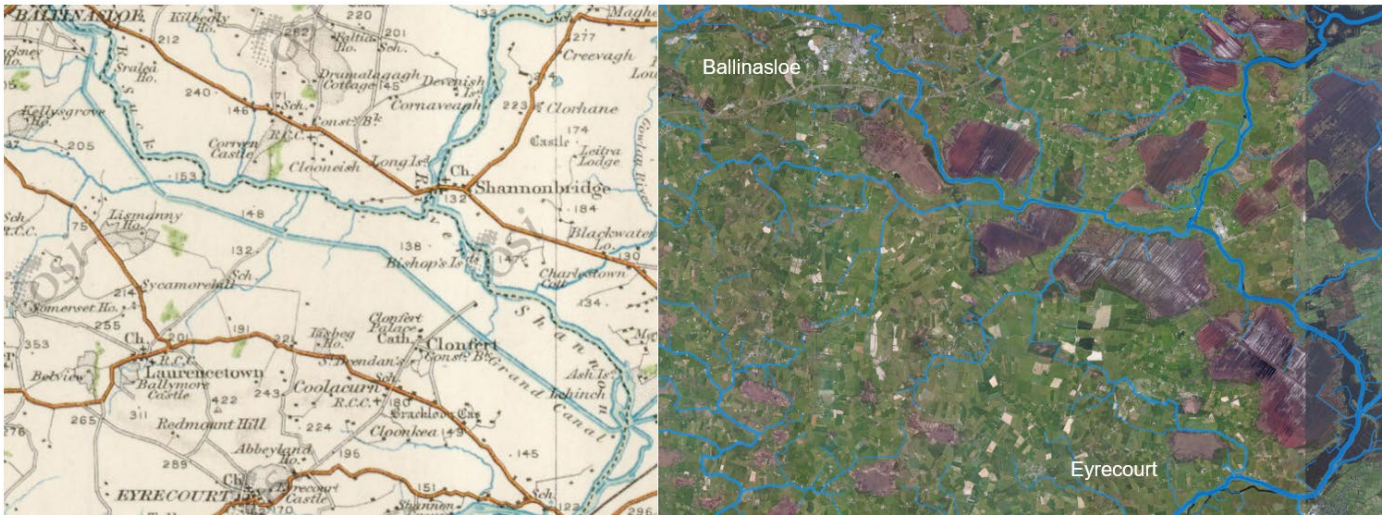

Figure 2-3: Location of Historical Water Features Ballinasloe to Eyrecourt

[4] Images (figure 2.2-2.3) sourced from Historical 6inch Mapping (geohive.maps.arcgis.com) and EPA Hydronet (gis.epa.ie), accessed October 2021.

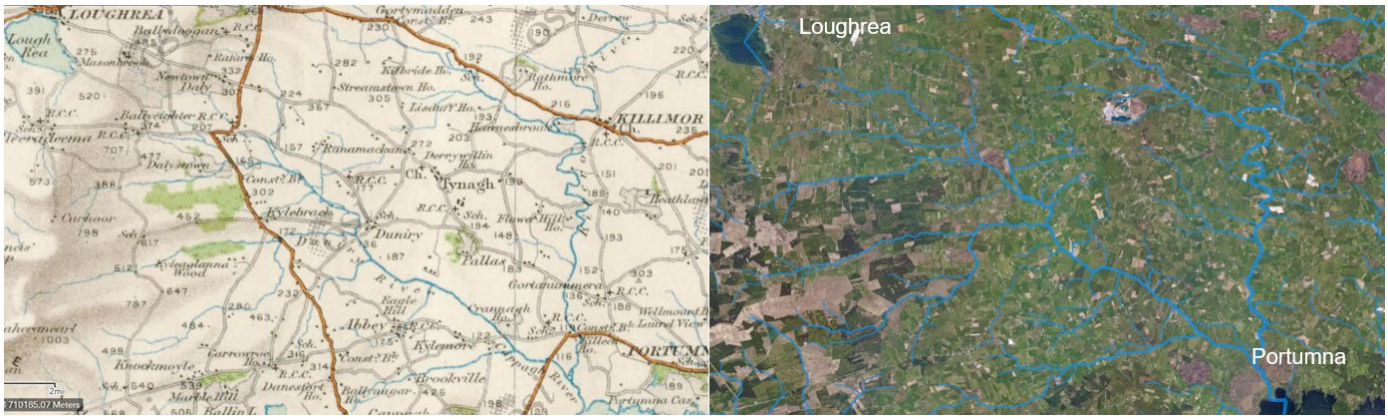

Figure 2-4: Location of Historical Water Features Loughrea to Portumna

The OPW Arterial drainage mapping was also consulted and there is evidence that the River Cappagh (IE_SH_25C030500) and River Kilcrow (IE_SH_25K010700) and surrounding lands north of Lough Derg benefit from arterial drainage (see **Figure 2-5**).

There is also evidence of arterial drainage on the River Abbert (IE_WE_30A010100) and surrounding lands in the northwest of the study area, as well as arterial drainage on the Reask River (IE_SH_25S012000) where it joins the Shannon Lower (IE_SH_25S012000) near Shannon Harbour.

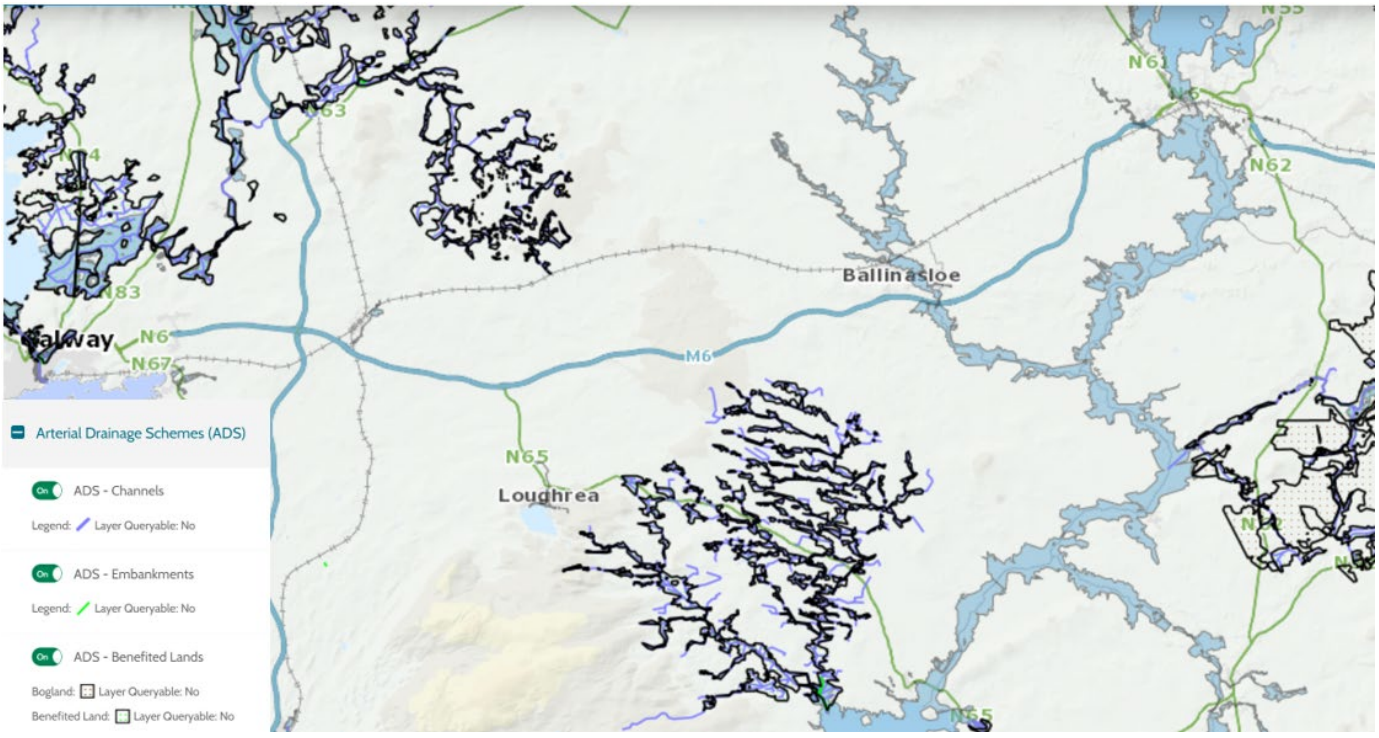

Figure 2-5: OPW Arterial Drainage Scheme with Benefited Lands[5]

[5] Image source (Source: www.floodinfo.ie), accessed October 2021.

2.1.3 Flooding Aspects and Floodplains

2.1.3.1 Historical Flooding

The OPW flood maps website (www.floodmaps.ie) show numerous numbers of flood prone areas within the subject study area. In regard to historic flooding, the low-lying flood plains of the Rivers, Clare, Suck and Shannon experienced severe flooding in December 1954, winter 1999/2000, November 2009 and winter 2015/2016. Further details of these flood events can be found in the OPW www.floodinfo.ie website.

Historical flooding appears most prevalent in the areas between Galway and Athenry, heading south along N18 towards Gort, and the area around Ballinasloe (see **Figure 2-6**).

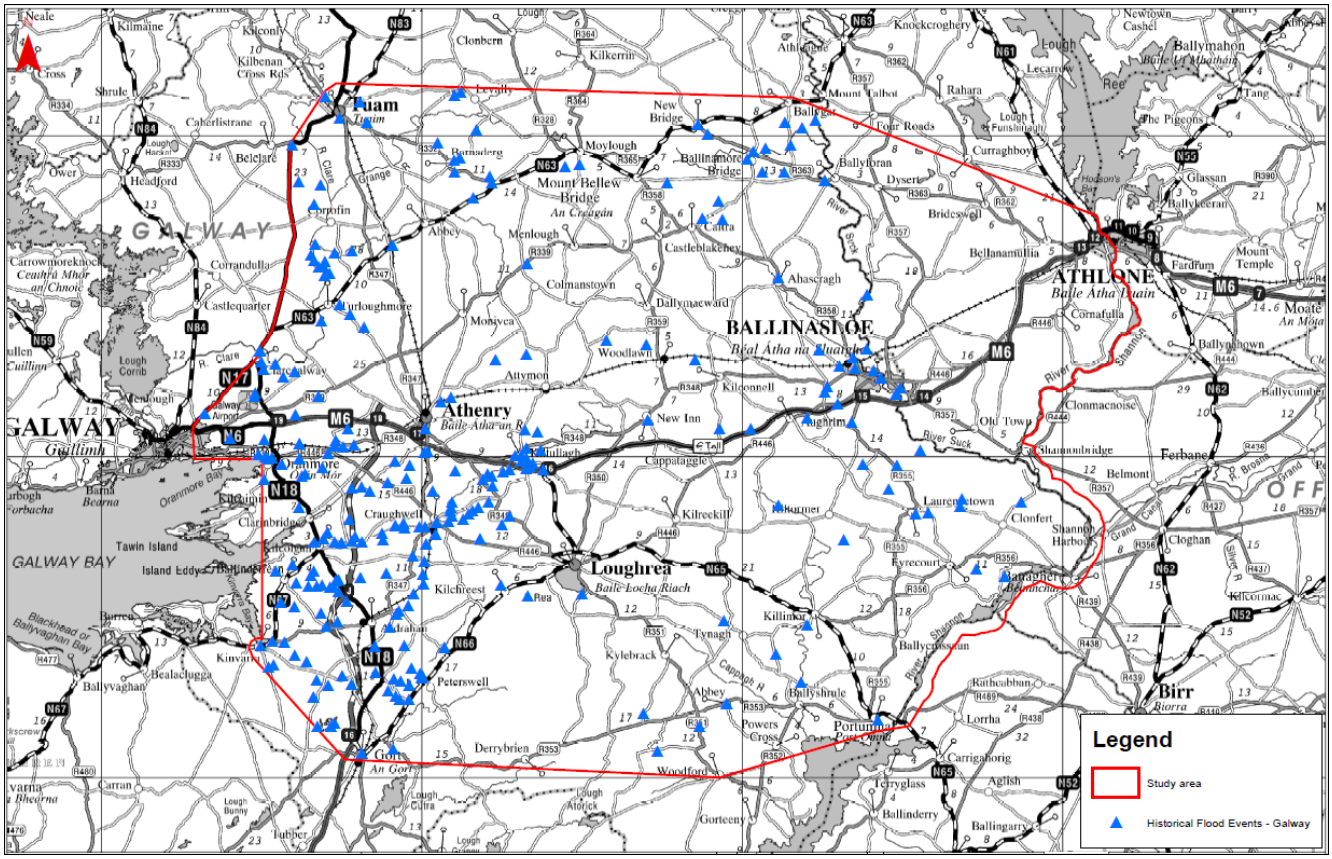

Figure 2-6: OPW Historical Flooding[6]

The OSI Historical Mapping dataset was also consulted to investigate any flood prone areas dating back to the 1830s within the study area. Blue diamonds represent flood points. Historic flood plains (areas shaded in blue) were noted surrounding Craughwell between Athenry and Loughrea (see **Figure 2-7**).

[6] Image access from OPW (www.floodmaps.ie), September 2020.

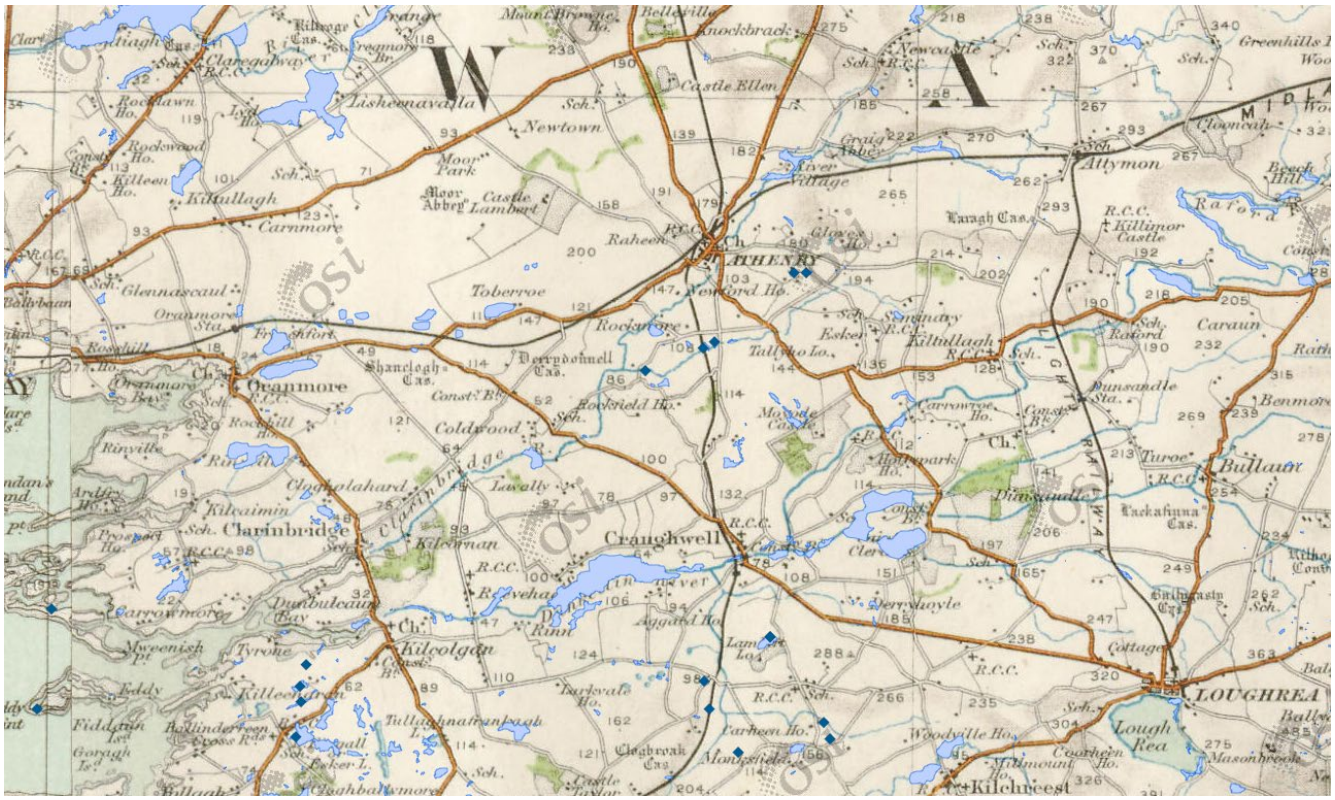

Figure 2-7: OSI Historical Flooding Galway to Loughrea[7]

Further historic flood plains were noted along the Upper and Lower River Shannon between Shannonbridge and Portumna (see **Figure 2-8**). These records support predicted flood extents further outlined in the sections below.

RCO 1 travels along the Suck valley, or the Bunowen/Ahascragh river. These rivers are subject to seasonal flooding. The route along the Suck traverses a large flood prone area north of Ballinasloe. The cycleway would be build immediately adjoining the existing R358 road through the flood plain.

In Ballinasloe itself, the route would travel along the Suck through the town. Flood defence works are planned along the Suck in this area, and it would be expected that the cycleway could be designed in conjunction with the flood relief works. In very extreme events, Ballinasloe does suffer from flooding on streets. The area around the harbour is flood prone, and the cycleway in this area would flood in extreme events, alog with the adjoining roads.

South of Ballinasloe, the route travels along the tow path of the grand canal through the flood plain. This tow path is elevated and is not flood prone.

In Ahascragh, the route utilises existing flood defences to traverse the flood prone areas. In undefended areas, the route would need to be offset from the river to avoid frequent flooding. This appears practicable in this case.

At Athenry, the route is close to the Clarin river, and would need to be engineered to prevent frequent flooding. This could entail either raising the cycleway on embankment, or an elevated deck.

In the context of the length of the route, it is not considered especially problematic in terms of flooding, and reasonable mitigation appears to be available. Mitigation could include raising the cycleway such that it is higher than the flood levels or moving it slightly such that it is outside the flood prone areas. A mixture of both measures would be most likely.

[7] Image access from OSI 6inch Historical Mapping (https://geohive.maps.arcgis.com/), October 2021.

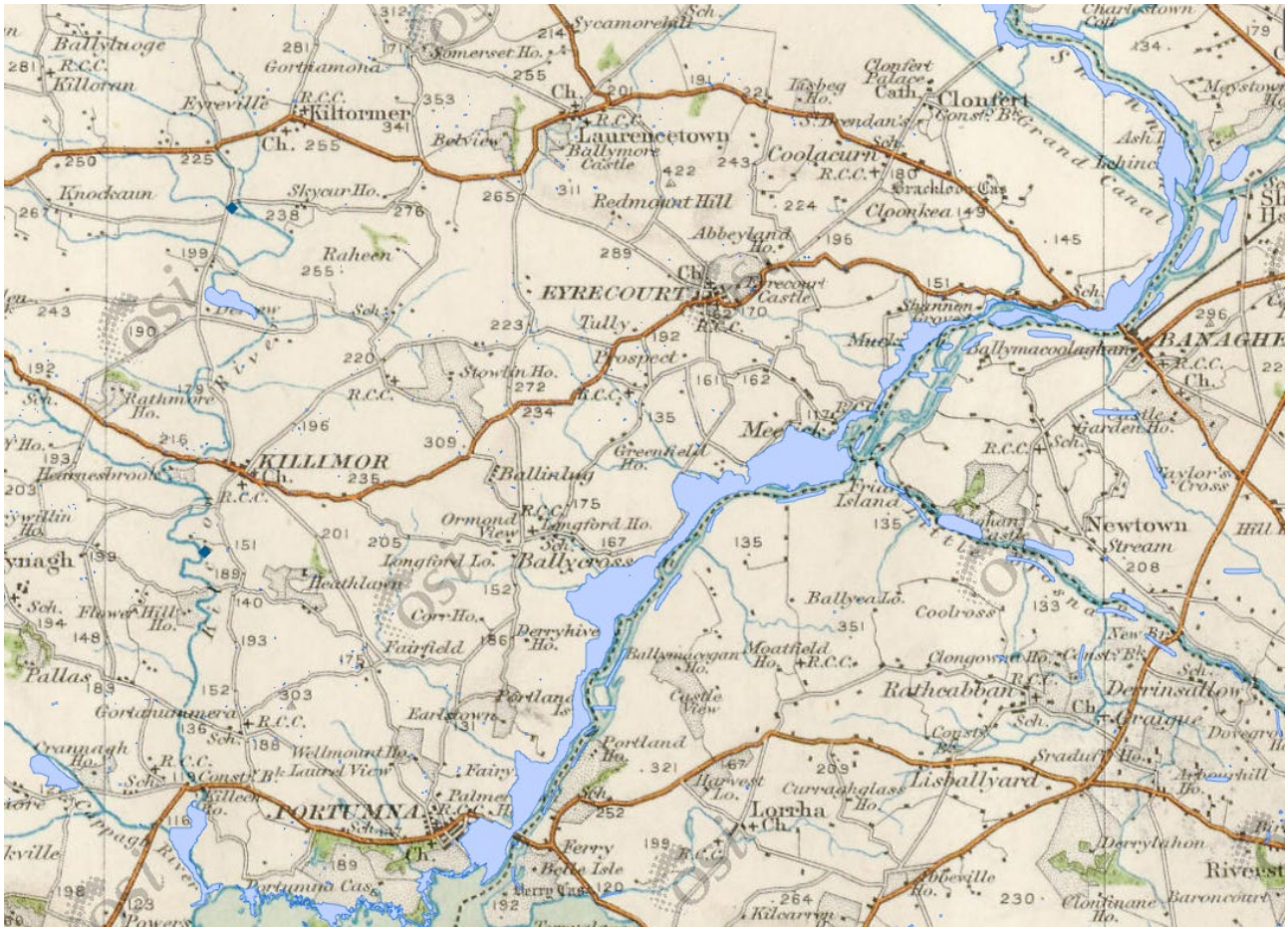

Figure 2-8: OSI Historical Flooding of Upper and Lower River Shannon[8]

2.1.3.2 Fluvial and Coastal Flood Risk

In 2018 under the National Catchment Flood Risk Assessment and Management (CFRAM) study, a detailed flood study was completed in Galway, Ballinasloe and Athlone, and a set of flood maps were prepared for all areas predicted to be flooded at some point during the flood events with a number of selected Annual Exceedance Probabilities (AEPs).

These probabilities may also be expressed as odds (e.g. 100 to 1) of the event occurring in any given year. Three flood extents were typically shown on these flood extent maps – Low probability (0.1% AEP); Medium Probability (1% AEP fluvial or 0.5% AEP Coastal); and, where appropriate, High probability (10% AEP). Flood maps were developed for the current scenario, and also for two potential future scenarios; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS), taking into account the potential impacts of climate change and other possible future changes.

Figure 2-9 shows the CFRAM study predicted flood extents within the study area for the current scenario for the AEPs. Flood maps for the future scenarios are included in **Volume B – Constraints Report**. It can be seen from these maps that floodplains associated with the Rivers, Clare, Suck and Shannon are liable to flooding within the subject study area. This will impact all Options in the area surrounding Athlone, with Option 4 and 5 being the most impacted by flooding of the Upper and Lower River Shannon.

[8] Image access from OSI 6inch Historical Mapping (https://geohive.maps.arcgis.com/), October 2021.

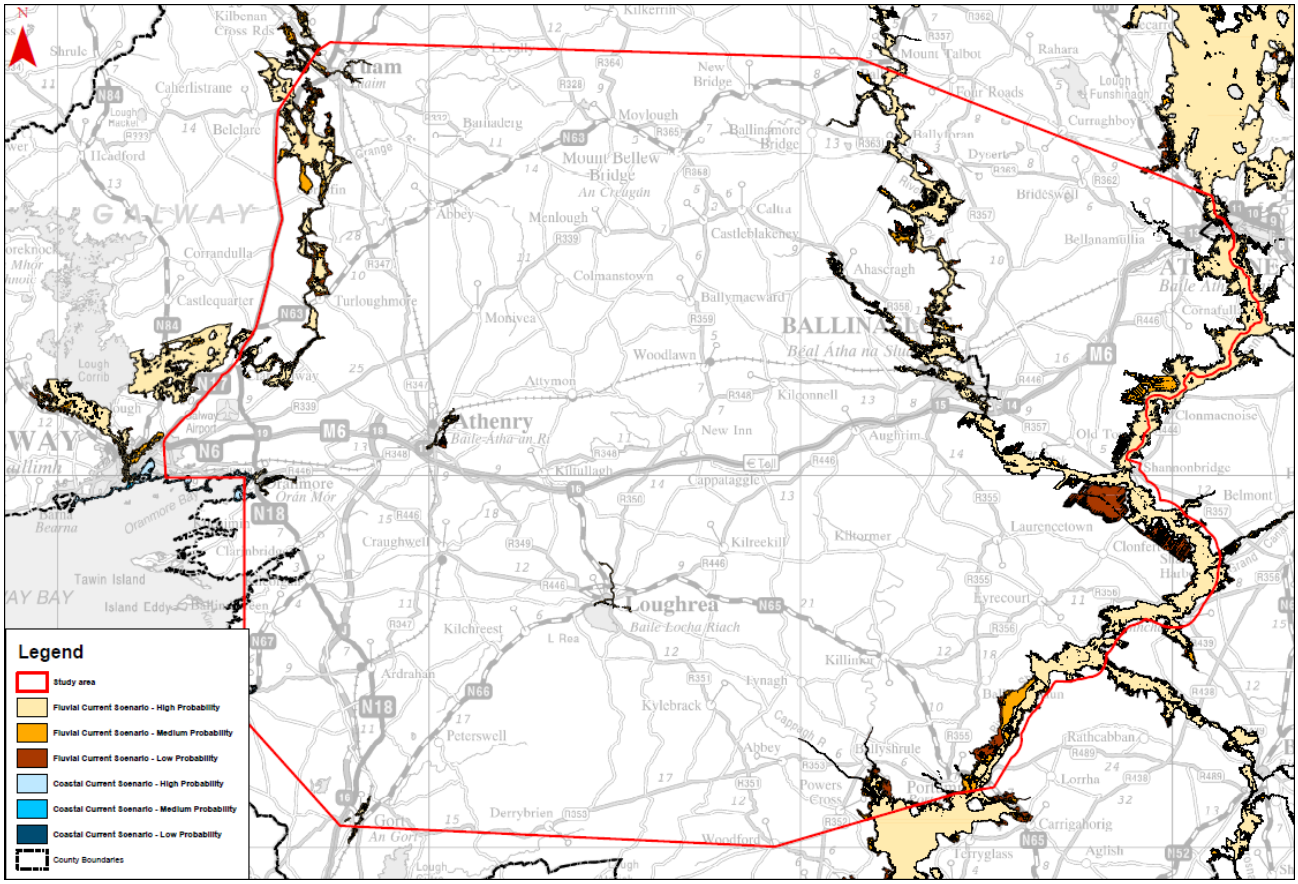

Figure 2-9: OPW CFRAM Study Predicted Flood Extents (Current Scenario)[9]

2.1.3.3 Groundwater Flood Risk

The historical and potential future groundwater flooding risks within the study area were also investigated. The Geological Survey of Ireland prepared historical and predictive flood maps across Ireland (particularly for the limestone karstic regions) under the GWFlood Project (2016-2019). The predictive groundwater flood map presents the probabilistic flood extents for locations of recurrent karst groundwater flooding. It consists of a series of stacked polygons at each site representing the flood extent for three specific AEP's (10%, 1%, and 0.1% respectively). The map is focussed primarily (but not entirely) on flooding at seasonally inundated wetlands known as turloughs.

Figure 2-10 shows the groundwater flood maps for a range of probabilities along with surface water flooding during the winter 2015/2016, a period where extensive groundwater flooding occurred in Ireland. It can be seen from this map that the predictive groundwater flooding within the study area is widespread, which can be attributed to the presence of numerous limestone-karstic type geological features within the study area.

For all options, groundwater flood risk is most predominant in the areas surrounding the Upper and Lower River Shannon, north and south of Athlone, and the areas surrounding the River Suck north and south of Ballinasloe.

[9] OPW CFRAM (www.floodinfo.ie), accessed September 2020.

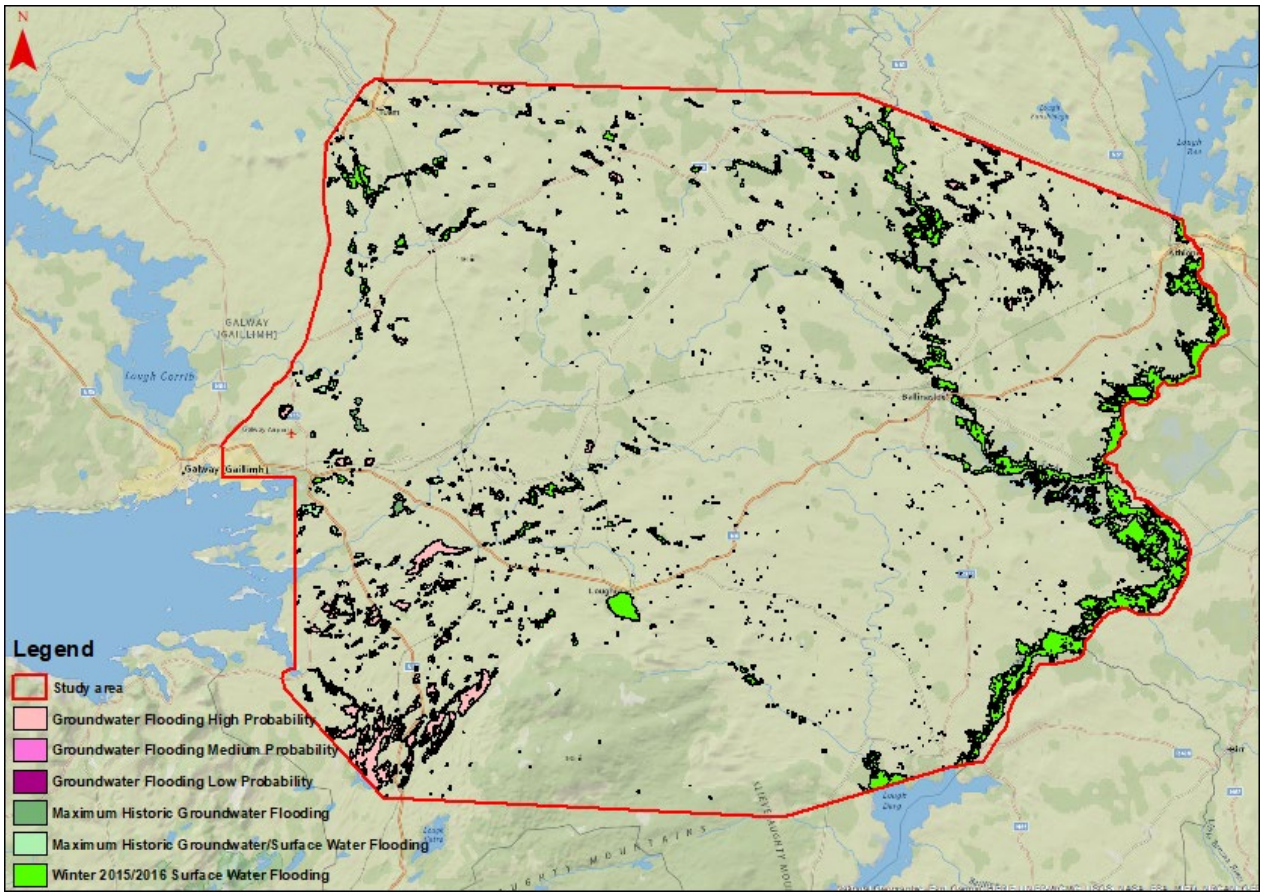

Figure 2-10: Groundwater Flooding (Historical & Predictive)

2.1.4 Surface Water Quality

Water Quality records for watercourses in the study area were sourced from the Environmental Protection Agency (EPA) online datasets (www.epa.ie). These results (2013-2018) show water quality varies across the study area and a significant number of the watercourses have not been assigned a WFD (Water Framework Directive). The water quality status for watercourses within the study area is provided in **Table 2.2**.

Table 2.2 Water Quality of Potentially Impacted Watercourses

EPA Name	EU River Waterbody Code	WFD Status 2013-2018	WFD Risk
Carrowmoneash (Oranmore)_010	IE_WE_29C050400	Unassigned	Review
Rockhill (Galway)_010	IE_WE_29R090950	Poor	Review
Clarinbridge_050	IE_WE_29C020500	Poor	At Risk
Kilcolgan_050	IE_WE_29K010700	Moderate	Review
Kilchreest_010	IE_WE_29K022100	Unassigned	Review
Boleyneendorrish_030	IE_WE_29B040800	High	Not at Risk
Cannahowna_010	IE_WE_29C010200	Poor	At Risk
Beagh_010	IE_WE_29B020100	Moderate	At Risk
Boleyneendorrish_020	IE_WE_29B040300	High	Not at Risk
Owendalulleegh_040	IE_WE_29O010900	High	Not at Risk
Owendalulleegh_030	IE_WE_29O010800	Good	At Risk

Owendalulleegh_020	IE_WE_29O010700	High	Not at Risk
Owendalulleegh_010	IE_WE_29O010500	Good	At Risk
Ballinlough Stream_010	IE_SH_25B150300	Good	At Risk
Woodford (Galway)_010	IE_SH_25W010040	Moderate	At Risk
Woodford (Galway)_030	IE_SH_25W010300	Good	Not at Risk
Moannakeeba_East_010	IE_SH_25M290660	Poor	Review
Kilcrow_070	IE_SH_25K010700	Moderate	At Risk
Shannon (Lower)_040	IE_SH_25A050100	Unassigned	Review
Shannon (Lower)_030	IE_SH_25S012350	Moderate	Review
Gortaha_010	IE_SH_25G560730	Good	Not at Risk
Carrownafinnoge_010	IE_SH_25C180820	Good	Not at Risk
Incherky_010	IE_SH_25I020930	Moderate	Review
Eyrecourt Stream_010	IE_SH_25E010200	Poor	At Risk
Shannon (Lower)_020	IE_SH_25S012060	Moderate	At Risk
Derryholmes_010	IE_SH_25Y150770	Good	Review
Shannon (Lower)_010	IE_SH_25S012000	Unassigned	Review
Suck_160	IE_SH_26S071550	Poor	Review
Shannon (Upper)_130	IE_SH_26S021920	Poor	Review
Ballydangan_020	IE_SH_26B140200	Poor	At Risk
Shannon (Upper)_120	IE_SH_26S021800	Poor	At Risk
Cross (Roscommon)_040	IE_SH_26C100400	Moderate	At Risk
Drumkeary Stream_010	IE_SH_25D110300	Good	Review
Duniry_020	IE_SH_25D070400	Good	Not at Risk
Cappagh (Galway)_010	IE_SH_25C030100	Good	At Risk
Cappagh (Galway)_020	IE_SH_25C030500	Moderate	At Risk
Kilcolgan_010	IE_WE_29K010100	Poor	Not at Risk
Kilcolgan_030	IE_WE_29K010400	Bad	At Risk
Carra Stream_020	IE_WE_29C032000	Good	Not at Risk
Toberdoney_020	IE_WE_29T010700	Moderate	At Risk
Raford_030	IE_WE_29R010500	Good	Review
Clarinbridge_040	IE_WE_29C020400	Poor	At Risk
Clarinbridge_030	IE_WE_29C020300	Poor	At Risk
Clarinbridge_020	IE_WE_29C020200	Moderate	Review
Clarinbridge_010	IE_WE_29C020040	Good	Not at Risk
Raford_020	IE_WE_29R010200	Moderate	At Risk
Raford_010	IE_WE_29R010100	Poor	At Risk
Ballymabilla_010	IE_WE_29B030300	Good	Not at Risk
Derrymullan Stream_010	IE_SH_26D070400	Moderate	At Risk
Ballinure_010	IE_SH_26B010300	Good	Review
Suck_150	IE_SH_26S071500	Moderate	At Risk
Suck_140	IE_SH_26S071400	Moderate	At Risk
Laurencetown Stream_020	IE_SH_26L070500	Poor	At Risk
Ahascragh_010	IE_SH_26A010050	Good	Not at Risk
Derrymullan Stream_010	IE_SH_26D070400	Moderate	At Risk
Derrymullan Stream_020	IE_SH_26D070700	Moderate	At Risk
Cuilleen Stream_010	IE_SH_26C170400	Moderate	At Risk
Suck_130	IE_SH_26S071200	Good	Not at Risk

Killeglan_010	IE_SH_26K040200	Moderate	At Risk
Mihanboy_010	IE_SH_26M040200	Moderate	At Risk
Suck_130	IE_SH_26S071200	Good	Not at Risk
Ahascragh_040	IE_SH_26A010500	Good	Not at Risk
Lughanagh_010	IE_SH_26L530780	Good	Review
Killaderry Stream_010	IE_SH_26K050940	Moderate	Review
Ahascragh_020	IE_SH_26A010200	Good	Not at Risk
Shiven (South)_030	IE_SH_26S030200	Good	Not at Risk
Castlegar_010	IE_SH_26C030100	Moderate	At Risk
Castlegar_020	IE_SH_26C030200	Poor	At Risk
Abbert_020	IE_WE_30A010100	Good	Not at Risk
Abbert_030	IE_WE_30A010300	Good	Not at Risk

2.1.5 Water Supply Sources

Many waterbodies, both groundwater and surface water, are currently being used as drinking water sources for private and public water supply within the subject study area. Lough Ree, Lough Derg and Lough Rea are the major surface water sources for public water supply along with a number of groundwater sources for private group water schemes (over 20 Nos.). The Dunkellin and Clarinbridge Rivers are also being used as public water supply.

2.1.6 Abstractions from Surface Water

Figure 2-11 shows the locations of abstraction points along with their associated source protection zones.

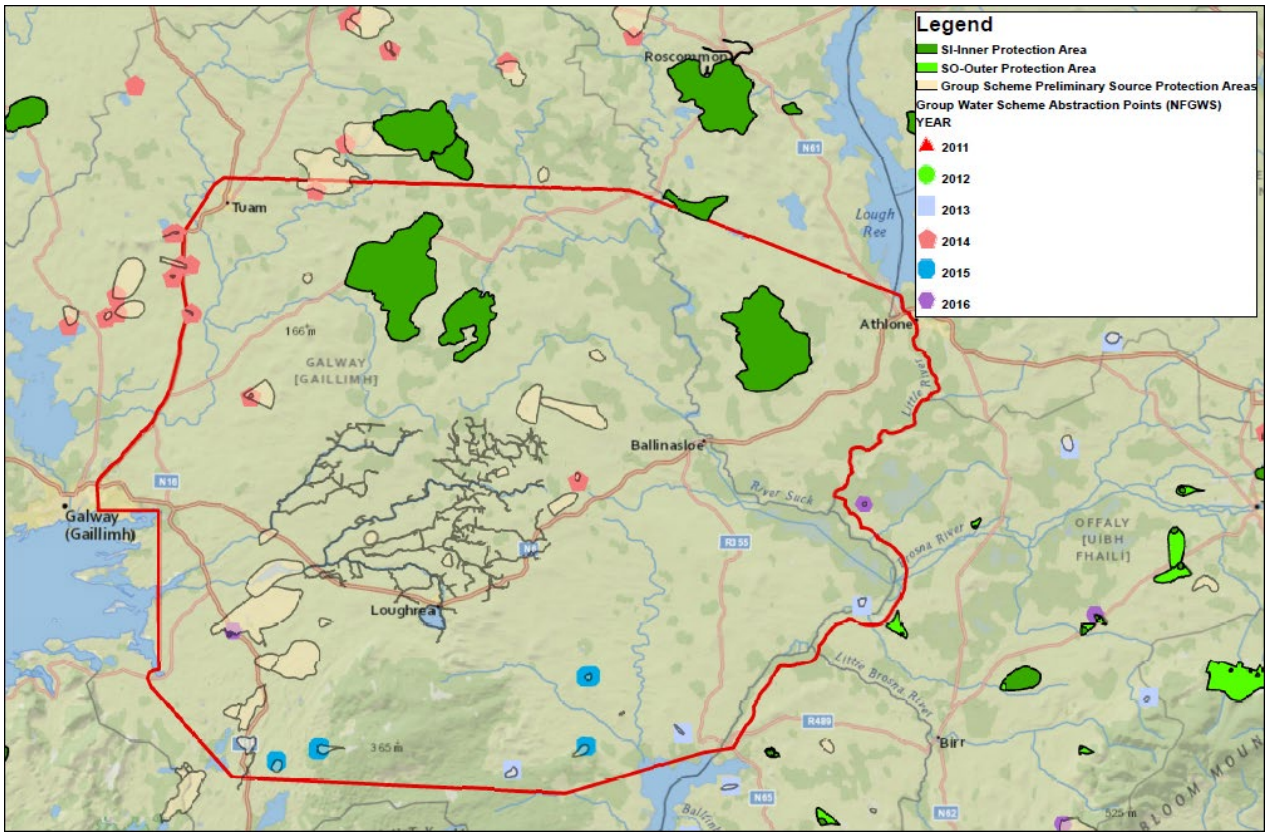

Figure 2-11: Water Supply Abstraction Points and associated Source Protection Areas

2.1.7 Discharges from Surface Water

Figure 2-12 below illustrates the locations of discharge points from industrial and municipal sewage effluent discharges. There can be seen to be industrial (Section 4) discharges (blue), urban wastewater discharges (red) and storm water overflows (green) in the study area.

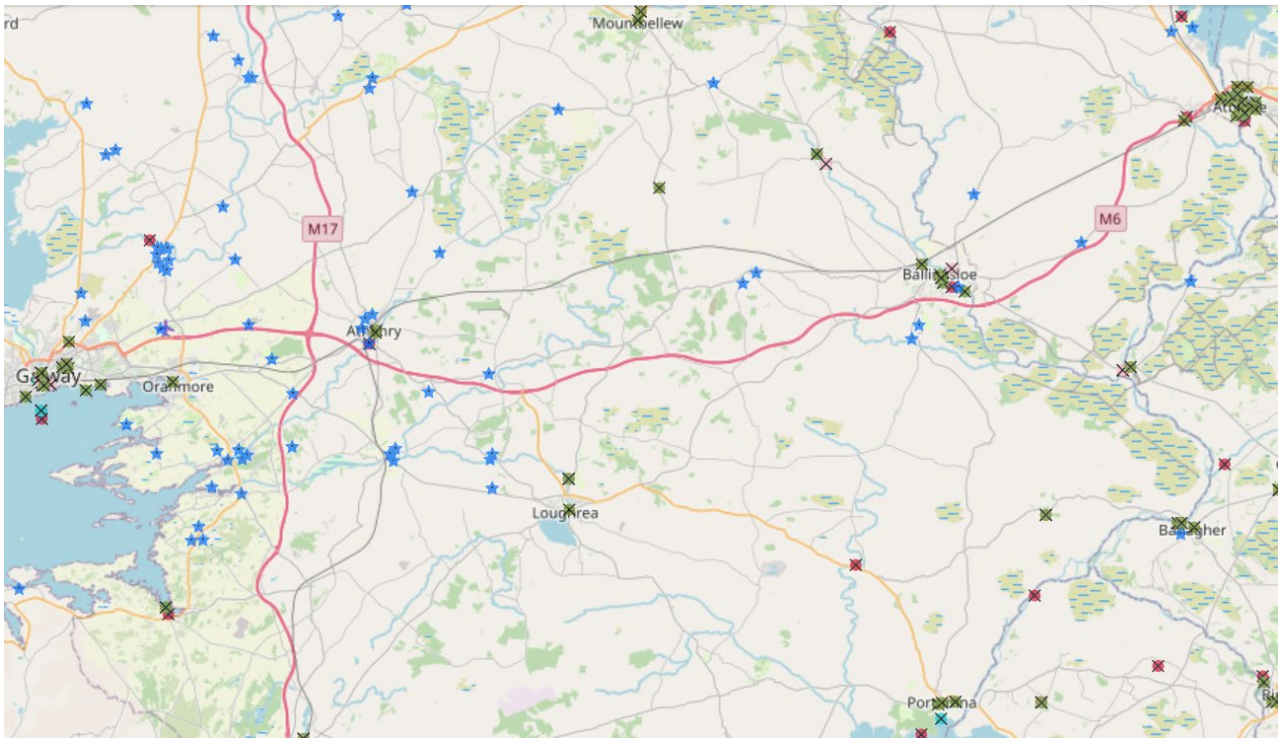

Figure 2-12: Discharge Locations within Study Area[10]

2.1.8 Aquatic Ecology and Ecological Issues

The rivers within the subject study area are large attractions with the water quality and services they provide. The Shannon is a very important mixed fishery with course angling and game. Many of the Shannon tributaries also hold important nursery habitat, salmonoid and lamprey spawning.

See **Appendices F1 Biodiversity** for greater in-depth description of identified ecological issues within the study area.

The following Special Areas of Protection (SPA) and Special Areas of Conservation (SAC) intersect the northwestern section of the study area and interact with the stated options:

- Corrib Estuary (IE_WE_170_0700) - All Options
- Inner Galway Bay North (IE_WE_170_0000) - All Options
- Oranmore Bay (IE_WE_170_0500) - All Options
- Dunbulcaun Bay (IE_WE_160_0800) - Option 5
- Kinvarra Bay (IE_WE_160_0100) - Option 5
- Inner Galway Bay South (IE_WE_160_0000) - Option 5

Rivers within Special Protection Areas (SPA):

- Rockhill 29_010 (IE_WE_29R090950)
- Carrowmoneash (Oranmore)_010 (IE_WE_29C050400)

[10] Image accessed from EPA Hydronet (gis.epa.ie/EPAMaps/), October 2021.

- Kilcolgan_050 (IE_WE_29K010700)
- Kilchreest_010 (IE_WE_29K022100)

Rivers within Special Areas of Conservation (SAC):

- Rockhill 29_010 (IE_WE_29R090950)
- Carrowmoneash (Oranmore)_010 (IE_WE_29C050400)
- Abbert_020 (IE_WE_30A010100)
- Shiven (South)_030 (IE_SH_26S030200)
- Kilcrow 25_040 (IE_SH_25K010300)
- Kilcrow 25_070 (IE_SH_25K010700)

See **Figure 2-13** below for designated sites and surface water interaction (SAC rivers in green, SPA rivers in yellow).

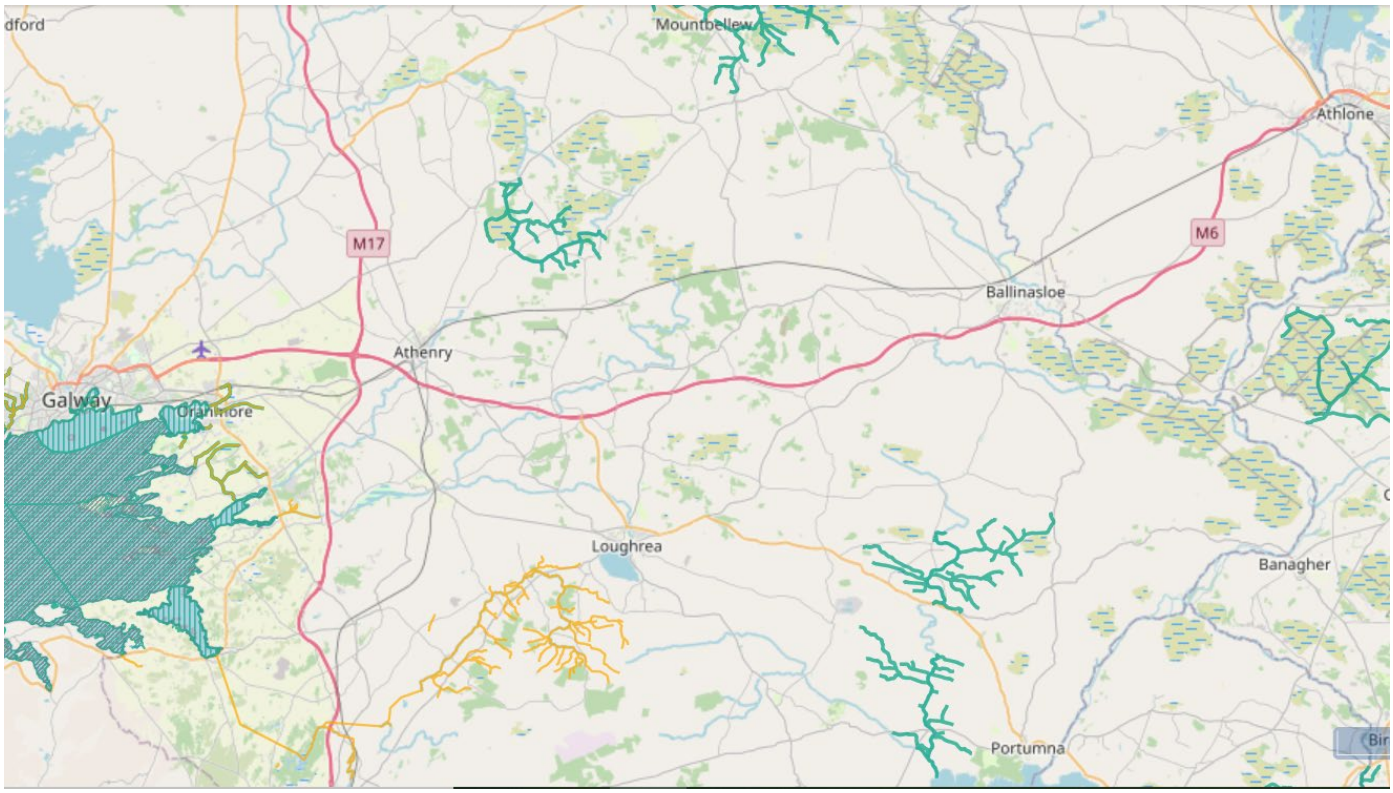

Figure 2-13: SAC and SPA Areas with Study Area

3 OPTION SELECTION AND CONCLUSION

3.1 Assessment of Potential Impacts

Impact to Receiving Waterbodies

The potential impacts to waterbodies within the routes have been assessed with consideration to the number of waterbodies within the option's ZOI. See **Table 2.1** for an outline of waterbodies within each option extent.

The number of waterbodies potentially impacted within each option is as follows:

Option 1 – 23 Waterbodies

Option 2 – 16 Waterbodies

Option 3 – 19 Waterbodies

Option 4 – 34 Waterbodies

Option 5 – 31 Waterbodies

Option 2 has the lowest number of waterbodies within it's ZOI, and therefore a likely lower potential impact to receiving waterbodies as assessed at Route Selection Stage. The highest number of waterbodies are found in Option's 4 and 5.

The total number of waterbody crossings, including existing crossings, will be further analysed in route design stage. It should be noted that waterbodies listed within the ZOI may not be considered as crossings, with potential for direct impact, in the route design. Furthermore, existing crossings have the potential to have minimal impact on the receiving waterbody if upgrades to the existing structures are not required.

The order of magnitude of the waterbody crossings will also be considered, with the assumption that larger magnitude waterbodies may require larger crossings, resulting in higher potential impacts.

Impact to Due to Fluvial and Coastal Flooding

CFRAM study predicted flood extents within the study area for the current scenario for the AEPs. Flood maps for the future scenarios are included in **Volume B – Constraints Report**. It can be seen from these maps that floodplains associated with the Rivers, Clare, Suck and Shannon are liable to flooding within the subject study area. This will impact all Options in the area surrounding Athlone, with Option 4 and 5 being the most impacted by flooding of the Upper and Lower River Shannon.

At route selection stage flooding impact is considered in terms of potential flooding areas within each route. The route expected to experience the greatest flooding risk is Option 5 (considering mid-range future flooding). This is due to the larger exposure to potential coastal flooding along Galway Bay to the west and potential future flooding of the Upper and Lower Shannon south of Athlone to the east. Flooding of the Upper and Lower Shannon is also a potential risk for Option 4.

Impact to Due to Groundwater Flooding

For all options, groundwater flood risk is most predominant in the areas surrounding the Upper and Lower River Shannon, north and south of Athlone, and the areas surrounding the River Suck north and south of Ballinasloe.

Option 4 and 5 are the most impacted by groundwater flooding of the Upper and Lower River Shannon. Option 1 is the most impacted by groundwater flooding of the Upper River Shannon and River Suck.

Impact to Abstraction and Discharge Locations

Impact to abstractions points is expected to be minimal due to the small area required for the cycleway and the opportunity to avoid direct contact to abstraction points during design of the proposed route. Areas with higher potential risks to abstraction points will be highlighted in further assessments.

The route with the highest potential to cross source protection areas is Option 1.

Discharge locations associated with the study area are largely focused in urban areas such as Galway, Athenry, Ballinasloe and Athlone. The major waterbodies associated with discharge locations are Lough Rea and Lough Derg and rivers such as the River Suck and Upper and Lower Shannon.

Option's 1, 4 and 5 have the most discharge points located within their ZOI.

Impact to Ecology

Option's 4 and 5 contain the greatest percentage of SAC and SPA areas within the study area. See **Appendix F1 Biodiversity** for greater in-depth assessment of identified ecological issues within the study area.