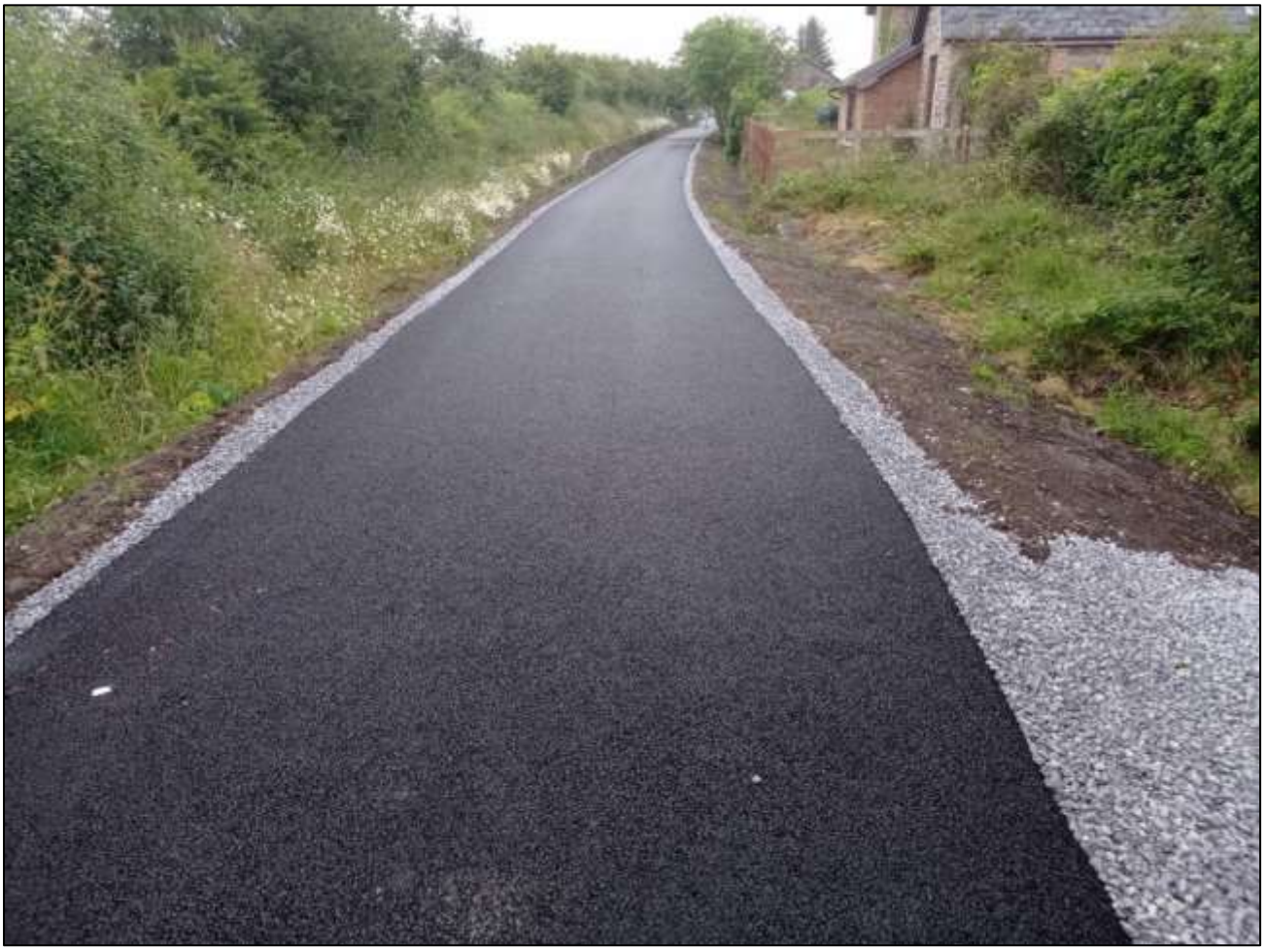
Appropriate Assessment Screening Report for ST08 Farm Overpass on the Limerick Greenway

Prepared on behalf of the Limerick City and County Council, by Rory Dalton.



27.9.2021

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Executive Summary

The current report informs the Competent Authorities, through the Appropriate Assessment process, that the construction and operational phases of the cattle Overpass on the Limerick Greenway outlined in Section 3.3 of this document will not have a likely significant effect, either alone or in-combination with other projects or plans, on a Natura 2000 Site. The tables in Section 4 detail the potential impacts to each conservation interest of each Natura 2000 Site within a 15km radius of the proposal.

The scale of the works at the Overpass is small, and the overpass is to be built largely within the footprint of pre-existing hard stands of the greenway and the individual farm roads. Disruption from machinery during construction will be short term, and will not be elevated greatly above the usual levels of machine operation at this busy farm crossing. The operational phase of the underpass will essentially be the same as their current state.

1. Introduction

Rory Dalton Ecology was appointed by Fehily Timoney and Company on behalf of Limerick City and County Council to prepare a report to inform their Screening for Appropriate Assessment report for work to be completed along the Limerick Greenway. The work consists of an overpass to cater for the movement of cattle and farm machinery within the more intensive farms which straddle the Greenway, as the mud and slurry typical of a cattle crossing would impede foot passage and would quickly become an unsightly element of the Greenway.

The function of this report is to provide information that will facilitate the competent authority in completing a Stage 1 Screening for Appropriate Assessment of the proposed project's potential to result in likely significant effects to the Conservation Objectives of Natura 2000 Sites either alone or in-combination with other plan or projects.

1.1. Appropriate Assessment Process

An Appropriate Assessment is undertaken to establish if any proposed plan or project is likely to have a significant effect on any site that has been designated under: the E.U. Habitats Directive (92/43/EEC) i.e. SAC; or the E.U. Birds Directive (79/409/EEC as amended 2009/147/EC) i.e. SPA. Collectively, SAC's and SPA's are known as Natura 2000 sites. The need to undertake one or more stages of this process has arisen from Articles 6(3) and 6(4) of the aforementioned Habitats Directive.

Article 6(3) of the Habitats Directive requires that:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

And Article 6(4) of the Habitats Directive requires that:

"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."

In Stage 1, a screening process is undertaken to identify likely significant effects on a Natura 2000 site are likely to arise from the project or plan in question. If significant effects are likely to occur or if it is unclear whether significant effects are likely to occur, then the process moves on to Stage 2 where an AA considers potential mitigation measures for adverse effects to the integrity of a Natura 2000 site. An NIS is provided by the advocate of the plan or project in question, the AA itself is undertaken by the competent authority.

2. Methodology

Documents associated with the proposed project and relevant ecology databases were consulted as part of this assessment, with a site walkover also undertaken. Furthermore, the following guidelines were used in the completion of this assessment;

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – European Commission Methodical Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (European Commission 2001).
- Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner's Manual (EPA 2013).
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DoEHLG 2009).
- European Commission (2018). Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC. Brussels, 2019
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management 2021
- Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (2021/C 437/01)

The Screening Stage of Appropriate Assessment is used to identify whether the Plan, either alone or in combination with other plans or projects, is likely to have a significant effect on a Natura 2000 site. This report follows European Commission (2021) guidance which recommends that screening should follow a four step process as outlined below:

1. : Determine whether the plan is directly connected with or necessary to the management of the site. If it is, then no further assessment is necessary.
2. : Describe the plan and other plans and projects that, 'in combination', have the potential to have significant effects on a European site.
3. : Identify the potential effects on the European site.
4. : Assess the significance of any effects on the European site.

3. Brief Description of the Sites and Proposed works

3.1 Site Description and Location

The overpass is located in the townland of Islandboy West, situated on the Great Southern Railway's Limerick to Tralee line, which is also known as the 'North Kerry Line'. In 1880 the line from Limerick to Barnagh and onto Tralee opened providing a link for the transport of both passengers and goods. The North Kerry Line ceased to carry passengers in 1963, however the line continued to carry goods traffic until 1977. The tracks of the Limerick to Tralee line were finally removed in 1988. The line has since become a Greenway providing amenity to locals.

3.2 Site Visit

Site visits were carried out on the 28th and 29th of June during which the existing environment was studied in relation to the proposed works put forward by Limerick County Council. The particulars of these site visits are outlined in the table below

Date	Weather	Surveyor
28th June 2021	**Temperature**: 20 - 21 degrees Celsius **Rain**: None, however it rained immediately after the survey **Cloud**: 1/8 **Wind**: F1 in the open, F0 in the woodland	Rory Dalton
29th June 2021	**Temperature**: 23 degrees Celsius **Rain**: None **Cloud**: 3/8 **Wind**: F1	Rory Dalton

3.3 Proposed Works

At Farm crossing number 1980 on the Limerick greenway farm machinery and livestock cross the greenway on a regular basis. To improve greenway safety and user experience an overpass is proposed. The overpass will allow farm traffic to go up and over the greenway segregating the two activities. A precast concrete box culvert type overpass is proposed. The greenway level will remain at existing and travel through a 4m x 3.6m opening in the box culvert. The existing farm track which crosses the greenway shall be raised up on earth embankments on approach to the overpass, to allow the farm track to travel over the top of the box culvert and down on the other side. The proposed farm track shall have a permeable stone surfacing to match existing. The farm track shall be constructed in accordance with S.199 Minimum Specification for Farm Roadways Jan 2021 Department of Agriculture Food and the Marine. An existing open drain runs around the perimeter of the agricultural field, this drain collects run off from the nearby agricultural field and carries it 250m west towards the Rathoran River which is a tributary to the River Feale. The open field drain occupies the space needed for the proposed earthen embankments. It is therefore a project requirement to enclose this drain with a rigid twin wall pipe so that the embankments may be constructed on top of and adjacent to the drain

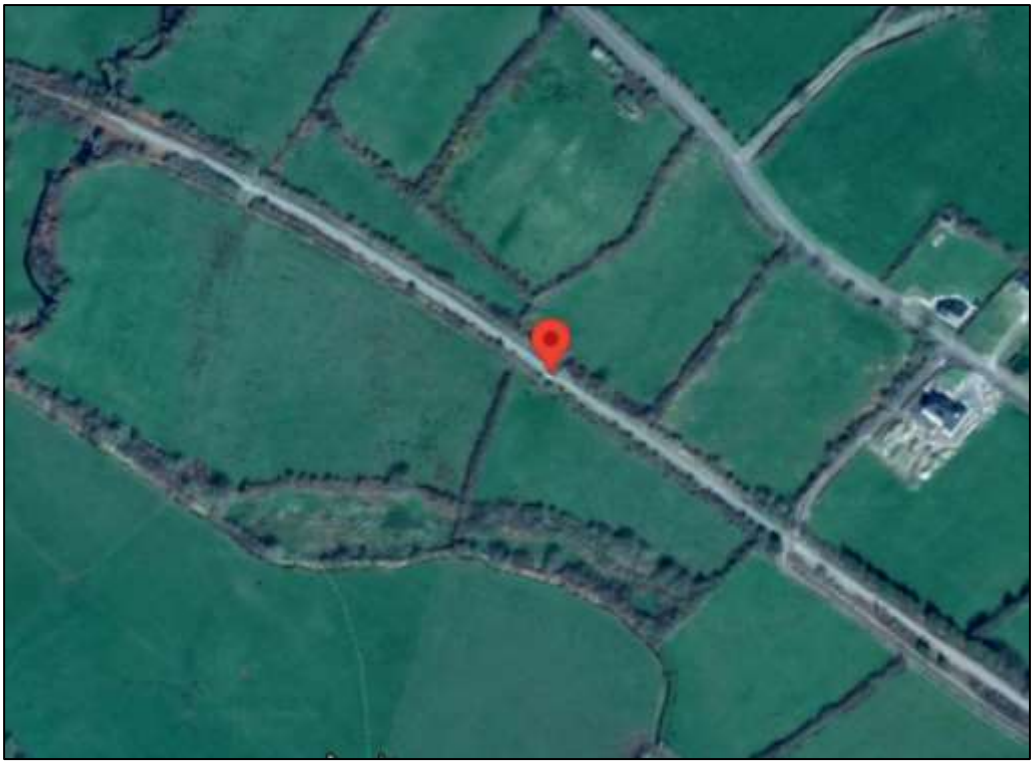
location. Due to landownership boundaries there is insufficient space to relocate the open drain, therefore it must be enclosed in a pipe.

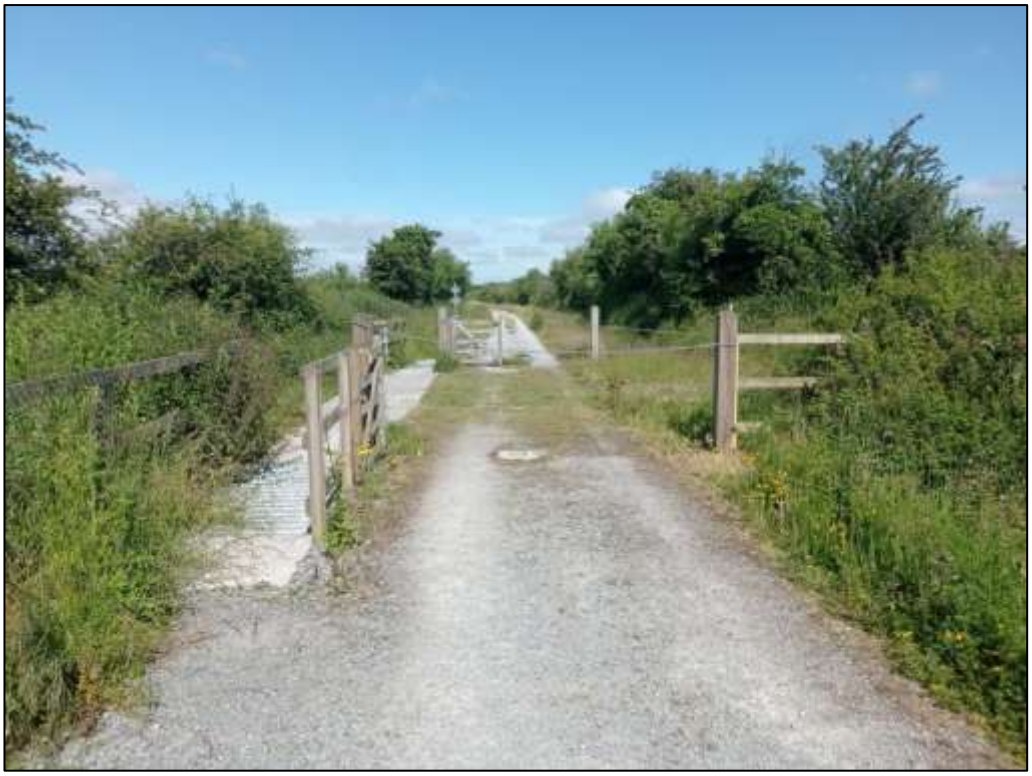
See outline construction methodology below

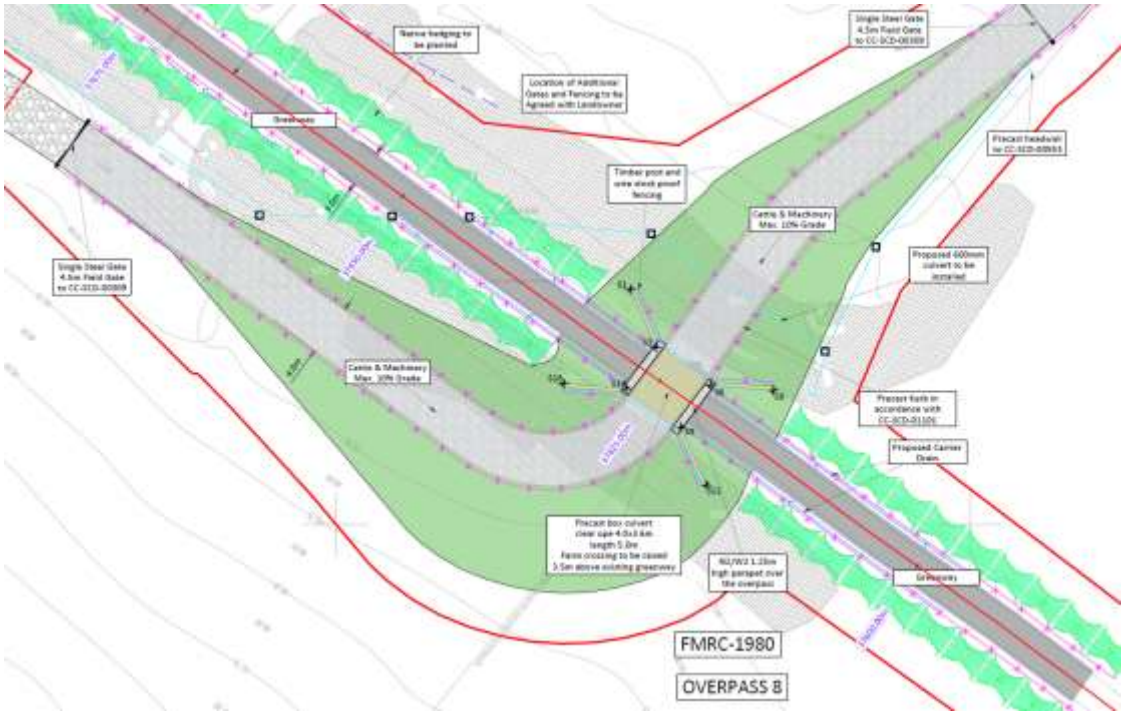
1. Greenway to be closed to the public. The site shall be secured from public access at all entrances by the temporary fencing. The temporary fencing shall be erected across both sides of the greenway east and west of the proposed construction area.
2. Due to the excavation works required on this project and the need to ensure acceptable fill material placed is at, or close to, the optimum moisture content for compaction the works shall only be carried out in dry weather when ground conditions are suitable.
3. The existing field drain is an open v drain, cut into the existing ground profile to provide field drainage. It is approximately 0.45m deep and typically 0.6m wide. The existing drain has a low flow volume. It is proposed that the drain will be blocked by the use of sandbags at the entry and exit points to the site. As the flow volume in the existing drain is low, seepage will be absorbed into the drain bed, pumping is not to required. In the unlikely event that pumping is required, it will be directed into the adjacent field. This step is required so that the installation of the piping for the drain described in the following steps can be undertaken in the dry, which is an engineering requirement for this type of work.
4. In the section of drain now dried, soft material and vegetation will be removed. A layer of clean granular material will be installed as pipe bedding in accordance with the specification for road works. Run off from this activity will be minimal as the drain will be dry.
5. A 450mm diameter twin wall HPDE pipe will be laid on top of the pipe bedding. The pipe shall be installed to match the fall of the existing drain.
6. Precast headwalls will be lowered into position at either end of the drain. The headwall will be precast concrete and will be placed on a granular base using an appropriately sized excavator.
7. Precast or HPDE access chambers will be placed at all sharp changes in pipe direction.
8. Where the existing drain crosses the greenway, it has been piped with a 300mm dia pipe previously. This pipe will be removed and upgraded to match the size of the pipe proposed.
9. The pipe sections shall be connected to the headwall and access chambers using pipe connectors. The pipe connectors create a watertight seal.
10. The piping and headwall shall be backfilled with granular pipe bedding. The precast headwall shall retain the backfill.
11. Once pipe has been backfilled, the sandbags will be removed. Water flow will return to the pipe. As the pipe will be fully enclosed and separated from the backfill sediment on initial wetting shall be very minimal.
12. As the existing drainage must be fully enclosed before the embankment construction can commence, run off from the embankment construction cannot enter the existing drain.
13. Top soil under the existing embankments shall be stripped back to an appropriate formation level. Excavated material shall be taken off site.
14. The foundation areas for the precast overpass shall be excavated down to a suitable formation level. Expected 1-2m below existing ground level. Granular fill shall be placed and compacted on the overpass formation area.
15. Granular stone fill shall be imported and placed on the formation level to upgrade the existing farm road on the north side of the overpass location to allow a crane to access from the existing entrance off the public road.
16. The precast overpass shall be lifted into position in segments by a crane.
17. The precast wing walls either side of the overpass shall be lifted into position, and completed with in-situ concrete stich to complete the structure.
18. The farm road embankments either side of the overpass shall be built up in layers with imported fill.
19. The precast headwalls shall be installed on the overpass.

20. Waterproofing shall be applied to the overpass deck.
21. A concrete surface shall be applied on the deck of the overpass.
22. Safety barriers shall be bolted to the headwall on the overpass.
23. The embankments shall be top soiled and seeded.
24. Timber post and rail fencing shall be installed along the top of the embankment and tied into the safety barrier.
25. The farm track shall receive a final layer of clause 804 stone surfacing.
26. The greenway pavement shall be repaired.
27. Line marking shall be completed on the greenway pavement.

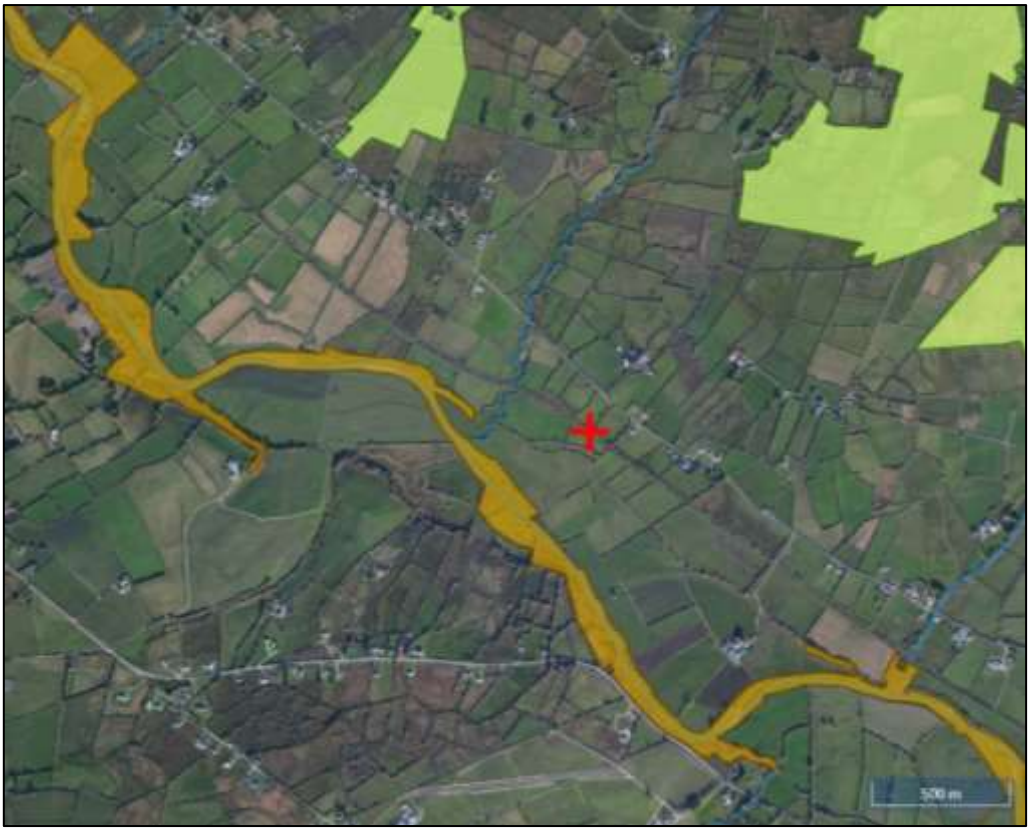
ST08 Farm Crossing







Crossing 8, taken from drawing P2152-ST08-0001



Crossing 8 (the red cross) within the context of surrounding Natura 2000 sites. The Lower River Shannon SAC is in brown and the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is in yellow.

4. Natura 2000 Sites and the Potential for Likely Significant Effects

4.1 Crossing 8

The following table identifies the Natura 2000 Sites to be included for assessment

Natura Site	Distance	Reason for Inclusion in the current Screening
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	The proposed overpass would be 994m from this SPA	Proposed works within 15km of the protected area
Lower River Shannon SAC (002165)	The proposed overpass would be 350m from this SAC	Proposed works within 15km of the protected area
Moanveanlagh Bog SAC (002351)	The proposed overpass would be 7km from this SAC	Proposed works within 15km of the protected area

The following table assesses the potential for effects to each individual conservation interest of each Natura 2000 site within 15km of the study area each Natura 200 site and thereby determines the need for mitigation and further analysis through Stage 2 NIS

Natura 2000 Site	Conservation Interest	Assessment of Potential Effects	Mitigation required
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	[A082]Hen Harrier (Circus cyaneus)	No likely significant effects are envisaged for this species. Potential nesting or foraging habitat does not exist within or adjacent to the footprint of the proposed works; although there is scrub within the footprint, it is not suitable for nesting hen harrier due to high disturbance rates by walkers and land owners. Foraging habitat nearby is sub-optimal, and so likely significant effects in terms of forging are not envisaged.	No
Lower River Shannon SAC (002165)	[1110] Sandbanks	No significant negative effects are envisaged for these habitats. These habitats do not exist within the footprint of the works. The closest possible hydrological connection to these habitats is estimated at over 40km via 250m soakage through a low gradient vegetated drainage ditch to the River Feale until it reaches the estuary of the Cashen - given the scale of the project, and the weak hydrological connection, it	No
	[1130] Estuaries		No
	[1140] Tidal Mudflats and Sandflats		No
	[1150] Coastal Lagoons*		No
	[1160] Large Shallow Inlets and Bays		No
	[1170] Reefs		No

	[1220] Perennial Vegetation of Stony Banks	is beyond reasonable scientific doubt that there will be no likely significant effects on these habitats .	No
	[1230] Vegetated Sea Cliffs		No
	[1310] Salicornia Mud		No
	[1330] Atlantic Salt Meadows		No
	[1410] Mediterranean Salt Meadows		No
	[6410] Molinia Meadows		No
	[3260] Floating River Vegetation	The conservation objectives supporting document: "*Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (habitat code 3260)*" shows that the closest floating river vegetation community of note within the SAC is on the Maigue, which is in a different catchment and theretofore not hydrologically connected. Pockets of the habitat subtype "Bryophyte-rich streams and rivers" may exist in the catchment, however the scale and nature of the works are too small to cause any likely significant effects to this habitat, particularly given the lack of direct hydrological connection.	No
	[91E0] Alluvial Forests*	No likely significant effects are envisaged for this habitat as it does not exist onsite. Additionally, due to the scale and nature of the project, any alluvial forests within the catchment of the works will not be effected.	No
	[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)	Not known to exist within the catchment downstream of the works: only known population on the Feale is upstream of Abbeyfeale.	No
	[1095] Sea Lamprey (*Petromyzon marinus*)	The main potential impact to these species from a project such as this involving earthworks is the silting of the spawning gravels. A short section of flowing drainage ditch will be closed in by placing a 450mm dia twin wall HPDE pipe and access chambers to be placed in existing drain for the full length of the works site. This piped section will be ~10 to 12m long and is spanning a drainage ditch with a low volume of flow (to give the reader an idea of the scale of this drain, it likely dries out during dry weather). This drain is not present on OS maps or on the EPA website, and is of no interest in terms of fisheries. It is relatively flat, and heavily vegetated with grasses and rushes, as well as brambles. It is proposed that the drain will be blocked using sandbags at the entry and exit points to the site. As the flow volume in the existing drain is low, the water volume will occupy the capacity of the drain channel, and so pumping is not required. In the unlikely case that pumping is required, it will be pumped into the open field adjacent. Once the works area has been dried, the pipes, headwalls and fill will be	No
	[1096] Brook Lamprey (*Lampetra planeri*)		No
	[1099] River Lamprey (*Lampetra fluviatilis*)		No
	[1106] Atlantic Salmon (*Salmo salar*)		No

		placed, after which the sandbags can be removed and the flow re-instated. Due to the piped section of drain the works area is hydraulically isolated from the nearby SAC. The inclusion of drain piping is a project requirement to allow sufficient space for embankment construction. No likely significant effects are envisaged as a result of the works for these species.	
	[1349] Bottle-nosed Dolphin (*Tursiops truncatus*)	Does not exist within the catchment of the works	No
	[1355] Otter (*Lutra lutra*)	No mammal burrow found within the footprint of the proposed works during the site visit. The drainage ditch within the site is of no use to otter in terms of foraging as it is of no value in terms of fisheries, and is closed in with a dense web of brambles and other vegetation from the base of the drain to the brim. As such no likely significant effects are envisaged.	No
Moanveanlagh Bog SAC (002351)	[7110] Raised Bog (Active)*	No significant negative effects are envisaged for these habitats due to the scale and nature of the underpass as well as the fact that there is no hydrological connectivity between the underpass and this SAC.	No
	[7120] Degraded Raised Bog		No
	[7150] Rhynchosporion Vegetation		No

4.2 Cumulative Effects

The re-gravelling and tarmacadaming of the Greenway in that area is currently (as of Autumn 2021) under way. This is the only known project of the scale capable of causing significant effect in the area. The resurfacing project however was given due ecological and environmental appraisal as part of the planning process, and any ecological constraints and features of interest were identified and avoidance or appropriate measures were woven into the fabric of the proposal. Given the relatively isolated rural setting, no nearby planning applications were found addressed within the townland of Islandboy West. The wider area, which is known as Purt, has a number planning applications for one off houses and extensions, as can be seen in the table below. The most recent application was in 2021, and the next most recent was in 2015; both of these were over 1km away; all other applications are over 10 years old, and the work on them has been carried out. As such, no cumulative effects are envisaged

App.	Applicant Name	Development Address	Application Date
21822	Donie & Margaret Meehan	Upper Purt, Abbeyfeale, Co. Limerick	30/06/2021
15879	Rita Cichorz	Purt, Abbeyfeale	04/11/2015
1145	William Riordan Jnr.	Upper Purt, Abbeyfeale	24/01/2011
091256	John Riordan	Upper Purt, Abbeyfeale	13/10/2009
091258	William Riordan Snr.	Upper Purt, Abbeyfeale	13/10/2009
09870	Thomas Twomey	Purt, Abbeyfeale	09/07/2009
083465	William Riordan Jnr.	Upper Purt, Abbeyfeale, Co. Limerick	15/12/2008
08900	Michael Gallagher	Purt, Abbeyfeale	08/05/2008
07705	Killian & Margaret Collins	Upper Purt, Abbeyfeale	29/01/2007
07113	EirGrid plc on behalf of ESB	Purt , Knocknasnas, Athea Upper	18/01/2007
063832	Killian & Margaret Collins	Upper Purt, Abbeyfeale	18/12/2006
063386	Killian & Margaret Collins	Upper Purt, Abbeyfeale	09/11/2006
063128	Killian & Margaret Collins	Upper Purt, Abbeyfeale	17/10/2006
063075	Patricia McCarthy & Tom Rothery	Purt , Abbeyfeale	12/10/2006
052691	Michael Gallagher	Purt, Abbeyfeale	20/09/2005
052505	Gerard O'Connell	Purt, Abbeyfeale	01/09/2005
052142	Patricia McCarthy and Tom Rothery	Purt , Abbeyfeale	27/07/2005

5. Conclusion

It is concluded beyond reasonable scientific doubt that there are no likely significant effects from the proposed development on three the European sites identified for consideration (or any other European site beyond 15km) either alone or in combination with other plans or projects. No effects on the European Sites listed below are predicted. Therefore, the following three European sites have been 'screened out' within the Stage 1: Appropriate Assessment Screening Report:

- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)
- Lower River Shannon SAC (002165)
- Moanveanlagh Bog SAC (002351)

6. Bibliography

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Fossitt Julie A. "A Guide To Habitats In Ireland" October 2000

NPWS (2012) Lower River Shannon SAC (site code 2165) Conservation objectives supporting documentWater courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (habitat code 3260)

NPWS (2013) Site Synopsis: Lower River Shannon SAC (site code 2165) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht

NPWS (2014) Site Synopsis:Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014)Conservation Objectives:Askeaton Fen Complex SAC (0002279) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) Site Synopsis: Askeaton Fen Complex SAC (0002279) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) Site Synopsis: Moanveanlagh Bog SAC (002351) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015)Conservation Objectives: Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority.

NRA (2009b) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes, National Roads Authority

Synopsis of Relevant Sites

7.1 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA Site Synopsis

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The site is skirted by the towns of Newcastle West, Ballydesmond, Castleisland, Tralee and Abbeyfeale. The mountain peaks included in the site are not notably high or indeed pronounced, the highest being at Knockfeha (451 m). Other mountains included are Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghamuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh. The site consists of a variety of upland habitats, though almost half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (Picea sitchensis) and Lodgepole Pine (Pinus contorta). A substantial part (28%) of the site is unplanted blanket bog and heath, with both wet and dry heath present. The vegetation of these habitats is characterised by such species as Ling Heather (Calluna vulgaris), Bilberry (Vaccinium myrtillus), Common Cottongrass (Eriophorum angustifolium), Hare's-tail Cottongrass (Eriophorum vaginatum), Deergrass (Scirpus cespitosus) and Purple Moor-grass (Molinia caerulea). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (Juncus spp.) and some areas subject to scrub encroachment.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier. This SPA is a stronghold for Hen Harrier and supports the largest concentration of the species in the country. A survey in 2005 recorded 45 pairs, which represents over 20% of the all-Ireland total. A similar number of pairs had been recorded in the 1998-2000 period. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey. Short-eared Owl, a very rare species in Ireland, has been known to breed within the site. Nesting certainly occurred in the late 1970s and birds have been recorded intermittently since. The owls are considered to favour this site due to the presence of Bank Voles, a favoured prey item. Merlin also breed within the site but the size of the population is not known. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed. The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier and is one the top sites in the country for the species. The presence of three species, Hen Harrier, Merlin and Short-eared Owl, which are listed on Annex I of the E.U. Birds Directive is of note.

7.2 Lower River Shannon SAC Site Synopsis

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):
[1110] Sandbanks
[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1150] Coastal Lagoons*
[1160] Large Shallow Inlets and Bays
[1170] Reefs
[1220] Perennial Vegetation of Stony Banks
[1230] Vegetated Sea Cliffs
[1310] Salicornia Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[6410] Molinia Meadows
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (Margaritifera margaritifera)
[1095] Sea Lamprey (Petromyzon marinus)
[1096] Brook Lamprey (Lampetra planeri)
[1099] River Lamprey (Lampetra fluviatilis)
[1106] Atlantic Salmon (Salmo salar)
[1349] Bottle-nosed Dolphin (Tursiops truncatus)
[1355] Otter (Lutra lutra)

The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian rocks and the western stretches through Carboniferous limestone. The Mulkear flows through Lower Palaeozoic rocks in the upper reaches before passing through Namurian rocks, followed by Lower

Carboniferous shales and Carboniferous limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary.

Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (Zostera spp.) beds and patches of green algae (e.g. Ulva sp. and Enteromorpha sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a MacomaScrobicularia-Nereis community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (Spartina anglica) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (Salicornia europaea agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (Phragmites australis) and club-rushes (Scirpus maritimus, S. tabernaemontani and S. triquetrus). In addition to the nationally rare Triangular Club-rush (Scirpus triqueter), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (Typha angustifolia) and Summer Snowflake (Leucojum aestivum).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh-grass (Puccinellia maritima), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Sea-milkwort (Glaux maritima), Sea Plantain (Plantago maritima), Red Fescue (Festuca rubra), Creeping Bent (Agrostis stolonifera), Saltmarsh Rush (Juncus gerardi), Long-bracted Sedge (Carex extensa), Lesser Sea-spurrey (Spergularia marina) and Sea Arrowgrass (Triglochin maritima). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (Juncus maritimus) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus estuary: a type of robust saltmarsh-grass (Puccinellia foucaudii), sometimes placed within the species Common Saltmarsh-grass (P. maritima) and Hard-grass (Parapholis strigosa).

Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species

such as Beaked Tasselweed (Ruppia maritima) and green algae (Cladophora sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri, Palaemonetes varians, Sigara stagnalis and Enochrus bicolor). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort (Chara canescens and Chara cf. connivens).

Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (Beta vulgaris subsp. maritima), Sea Campion (Silene vulgaris subsp. maritima), Thrift and plantains (Plantago spp.). A rare endemic type of sealavender, Limonium recurvum subsp. pseudotranswallianum, occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (Anthyllis vulneraria) and Common Bird's-foot-trefoil (Lotus corniculatus).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin Paracentrotus lividus are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as Fucus spp., Ascophyllum nodosum and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - Matricaria maritima, Sea Campion and Curled Dock - Rumex crispus), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram – Ammophila arenaria is the dominant species).

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic; the Fergus is smaller and alkaline; while the narrow, fast flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats,

such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, Molinia meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes (Juncus spp.) and sedges (Carex spp.), and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (Sisyrinchium bermudiana) and Pale Sedge (C. pallescens).

Floating river vegetation characterised by species of water-crowfoot (Ranunculus spp.), pondweeds (Potamogeton spp.) and the moss Fontinalius antipyretica are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with Schistidium alpicola var. alpicola recorded from in-stream boulders on the Bilboa, new to Co. Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (Salix alba) dominates the tree layer with occasional Alder (Alnus glutinosa). The shrub layer consists of various willow species with Rusty Willow (Salix cinerea ssp. oleifolia) and what appear to be hybrids of S. alba x S. viminalis. The herbaceous layer consists of tall perennial herbs. A fringe of bulrush (Typha sp.) occurs on the river side of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ashalder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (Quercus robur), elm (Ulmus glabra and U. procera), Hazel (Corylus avellana), Hawthorn (Crataegus monogyna) and the shrubs Guelder-rose (Viburnum opulus) and willows. The ground flora is speciesrich.

While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (Q. petraea) forms the canopy, with an understorey of Hazel and Holly (Ilex aquifolium). Great Wood-rush (Luzula sylvatica) dominates the ground flora. Less common species present include Great Horsetail (Equisetum telmeteia) and Pendulous Sedge (Carex pendula).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of birch (Betula spp.), Hazel, oak, Rowan (Sorbus aucuparia), some Ash (Fraxinus excelsior) and willow (Salix spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora features prominent Great wood-rush and Bilberry (Vaccinium myrtillus), along with a typical range of woodland herbs. Bracken (Pteridium aquilinum) is a feature in areas where there is more light available.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. There is a good scrub layer with Hawthorn, willow, Holly and Blackthorn (Prunus spinosa) common. The herb layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The Hazel is actively coppiced in places.

There is a small area of actively regenerating cut-away raised bog at Ballyrorheen. It is situated approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (Sphagnum spp.). Species of particular interest include Cranberry (Vaccinium oxycoccos) and White Sedge (Carex curta), along with two regionally rare mosses, including the bog moss S. fimbriatum. The site is being invaded by Downy Birch (Betula pubescens) scrub woodland. Both commercial forestry and the spread of Rhododendron (Rhododendron ponticum) has greatly reduced the overall value of the site.

A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (Protection) Order, 1999. These include Triangular Club-rush (Scirpus triquetrus), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (Groenlandia densa) is found in the Shannon where it passes through Limerick City, while Meadow Barley (Hordeum secalinum) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (Viola hirta) occurs in the Askeaton/Foynes area. Golden Dock (Rumex maritimus) is noted as occurring in the River Fergus estuary. Finally, Bearded Stonewort (Chara canescens), a brackish water specialist, and Convergent Stonewort (Chara connivens) are both found in Shannon Airport Lagoon.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bartailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland Whitefronted Goose were regularly found, but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (Petromyzon marinus), Brook Lamprey (Lampetra planeri), River Lamprey (Lampetra fluviatilis), Twaite Shad (Allosa fallax fallax) and Salmon (Salmo salar). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey. Two additional fish species of note, listed in the Irish Red Data Book, also occur, namely Smelt (Osmerus eperlanus) and Pollan (Coregonus autumnalis pollan). Only the former has been observed spawning in the Shannon. Freshwater Pearl Mussel (Margaritifera margaritifera), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale. In the past, cord-grass (Spartina sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds. Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats

. Fishing is a main tourist attraction on the Shannon and there are a large number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

7.3 Moanveanlagh Bog SAC

Moanveanlagh Bog is situated in Co. Kerry approximately 6 km east of Listowel, mainly within the townlands of Carhooeara and Bunagarha. The site comprises a raised bog that includes both areas of high bog and cutover bog. The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[7111] Raised Bog (Active)*
[7121] Degraded Raised Bog
[7151] Rhynchosporion Vegetation

Active raised bog comprises areas of high bog that are wet and actively peatforming, where the percentage cover of bog mosses (Sphagnum spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, Sphagnum lawns, flushes and soaks. Degraded raised bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes White Beak-sedge (Rhynchospora alba) and/or Brown Beak-sedge (R. fusca), and at least some of the following associated species, Bog Asphodel (Narthecium ossifragum), sundews (Drosera spp.), Deergrass (Scirpus cespitosus) and Carnation Sedge (Carex panicea).

This is a relatively flat site with some marginal areas that slope relatively steeply towards the cutover. There are a few large hummocks but over much of the site the micro-topography is very uniform. A flush area extends along the north and northeast of the site. In the south-west a bog burst has occurred and concentrically arranged tear pools can be seen, some of which are up to 12 m long. A swallow hole occurs near the middle of the site. Cutover bog occurs around the south-west, south and south-eastern margins of the high bog.

Much of the high bog has vegetation typical of a Western Raised Bog. The vegetation of the high bog is dominated by Bog Asphodel, White Beak-sedge, Cross-leaved Heath (Erica tetralix) and Carnation Sedge. Small patches of the moss Racomitrium lanuginosum and Common Lousewort (Pedicularis sylvatica) occur at the site. Purple Moor-grass (Molinia caerulea) is very common in the flush areas. The tear pools are mostly bare of vegetation but some support bladderwort (Utricularia sp.) and the bog mosses S. cuspidatum and S. auriculatum, with S. papillosum and the moss Campylopus atrovirens occurring at the pool edges. Towards the margins of the bog Bog-myrtle (Myrica gale) is frequent.

Current land uses on the site consist of a small area of peat-cutting at the margins and a low level of grazing by cattle in the north-east section of the high bog. Peatcutting has significantly declined since the 1970s. Other damaging operations include extensive fire damage, which is still occurring, and the dumping of household refuse and cars around the high bog. These are all activities that have resulted in the loss of habitat and damage to the hydrological status of the site, and pose a continuing threat to its viability. This site also suffers from invasive species, with the shrub Rhododendron (Rhododendron ponticum) recorded on the western edge of the site and the carnivorous Pitcher Plant (Sarracenia purpurea) forming a large colony.

Moanveanlagh Bog is significant in terms of its geographical location as it is at the extreme south-western range of raised bogs in Ireland. Moanveanlagh Bog is a site of considerable conservation significance as it comprises a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats, including flushes. Active raised bog is listed as a priority habitat on Annex I of the E.U. Habitats Directive. Priority status is given to habitats and species that are threatened throughout the E.U. Ireland has a high proportion of the total E.U. resource of this habitat type (over 60%) and so has a special responsibility for its conservation at an international level.